

SunSet xDSL

MRD-10000-001

REV: A

Marketing Requirements Document

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Mktg Mgmt



Proj Engr



Engr Mgmt



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1.0 Summary

The SunSet xDSL is the only field test set which can properly qualify copper lines for xDSL transmission. It earns this distinction because it is the only test set which tests copper lines using the actual DSL line codes and because it is the only set with advanced spread spectrum signal-to-noise tests. Primary benefactors are the first, second, and third level technicians of DSL providers, such as RBOC and CLECs, responsible for the installation, maintenance, and repair of DSL services. At maturity, the projected sales are 500 units/year generating revenues of \$2 million/year.

2.0 Change History

Rev	Date	By	Appr	Description
A	02/27/98	SK		Phase 1 Approval signoff

3.0 Reference Documents

- ANSI T1.413-1995: Network and Customer Installation Interfaces- ADSL Metallic Interface
- Bellcore TA-NWT-001210: Generic Requirements for High-Bit-Rate Digital Subscriber Lines
- ADSL FORUM TR-001: ADSL Forum System Reference Model [1997]
- ADSL FORUM TR-002: ATM over ADSL Recommendations [Mar 1997]
- MD 6100-1: HDSL Loop Back Methods
- Alcatel ADSL DynaMiTe: "Modem Control Interface (CTRLE) Specification" [V1.0, Oct 1997]
- Alcatel MTK-20131: "DynaMITE Rate Adaptive Asymmetrical Digital Subscriber Line Modem Chipset" [Rev. 1.0, Oct 1997]
- Alcatel MTC-20136: "ADSL Transceiver Controller" [Rev. 1.0, Nov 1997]
- Alcatel MTC-20135: "ADSL DMT Transceiver with ATM Framer" [Rev. 1.0, Aug 1997]
- Alcatel MTC-20134: "Integrated ADSL CMOS Analog Front-End Circuit" [Rev. 1.0, Aug 1997]
- PairGain OEM-HMO-SP2-03: Mini OEM Modules
- PairGain OEM-HMO-SW2-01: Mini OEM Modules ASCII Text Interface
- PairGain OEM-HMO-SW2-01: Mini OEM Modules Host Management Interface
- Bellcore GR-1089-CORE: Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment [Issue 1, Nov 1994]
- ANSI/IEEE Std 743-1995: IEEE Standard Methods and Equipment for Measuring the Transmission Characteristics of Analog Voice Frequency Circuits

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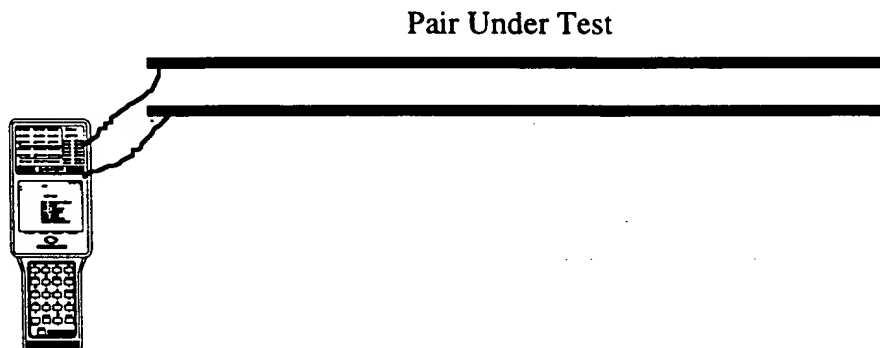
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4.0 Applications

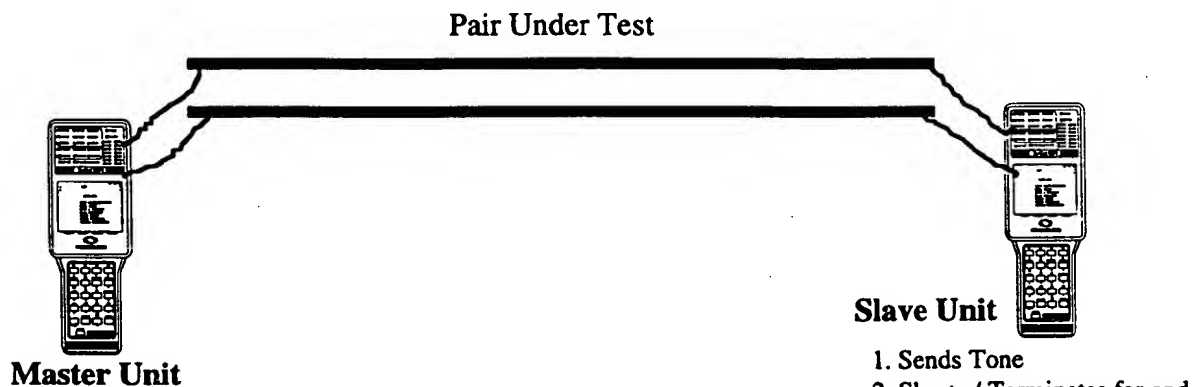
4.1 DMM and TDR Measurements

An xDSL tester is connected to the Cu pair under test using Bantam to 2-probe clip cable. DMM and TDR are used to locate cable faults, such as presence of loading coils, bridge taps, water in the cable, shorts, etc.



4.2 Line Measurements: Insertion Loss, Background Noise, Signal to Noise, Loop Resistance

These measurements are used to characterize transmission capabilities of the line and determine if the pair is fit for xDSL transmission at a range of 10 kHz to 1.5 Mhz. Two sets are required: Master Unit conducts measurements; Slave Unit generates required tones and properly sets up the far end.



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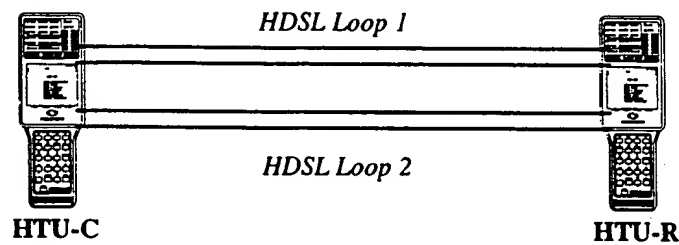
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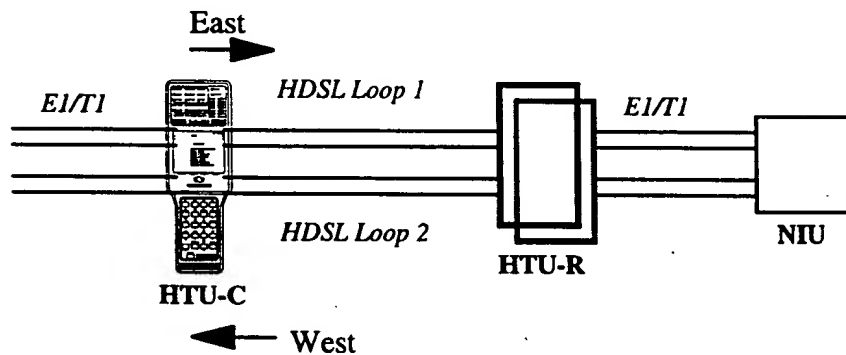
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4.3 HDSL

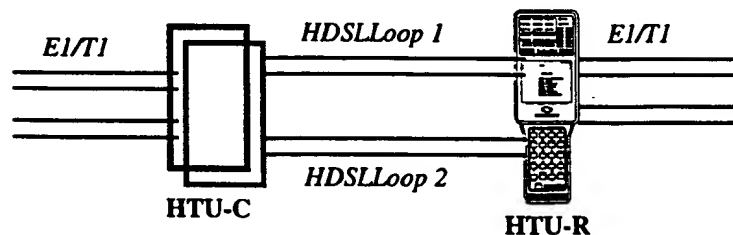
4.3.1 Dual HTU-C and HTU-R Emulation: The ultimate HDSL Loop Qualification Method



4.3.2 In-Service HTU-C or HTU-R Function



- In-Service BERT east or west
- Respond to loopback commands
- Report Modem Status
- In-Service HTU monitoring measurements



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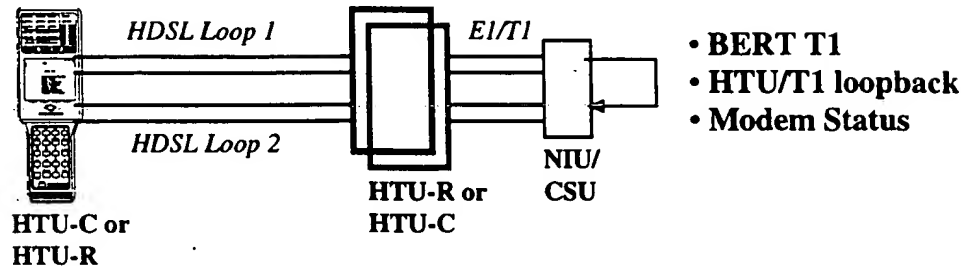
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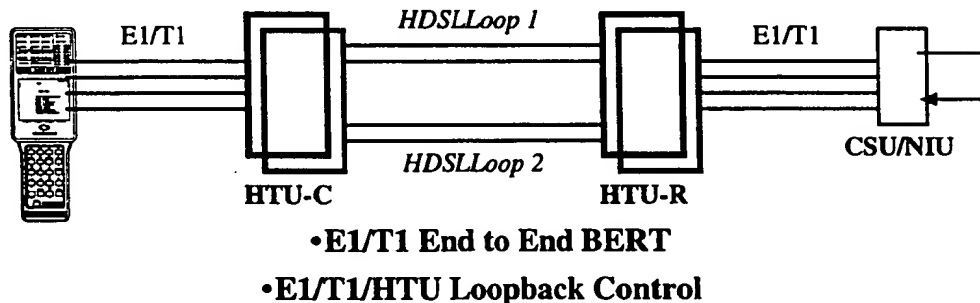
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4.3.2 HDSL: Out of Service HTU-C & HTU-R Function



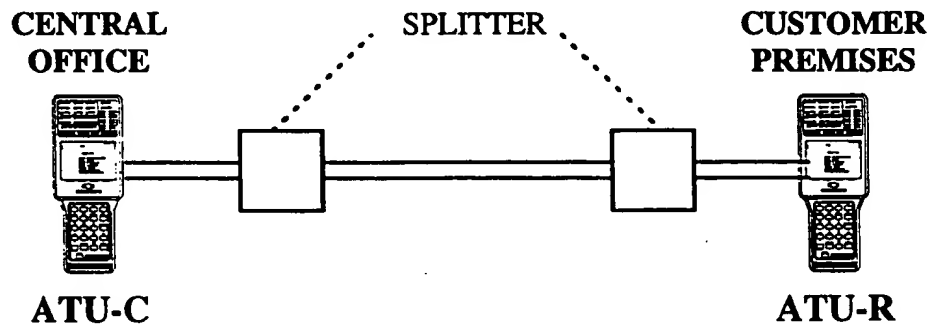
4.3.3 T1 and E1 testing on HDSL span:

- BERT at DSX-1 and NIU/CSU access points.
- NIU/CSU loopback testing from DSX-1
- Sa bit loopback testing for E1 systems.



4.4 ADSL:

4.4.1 Simultaneous ATU-C and ATU-R Emulation: Ultimate Method of ADSL Loop Qualification



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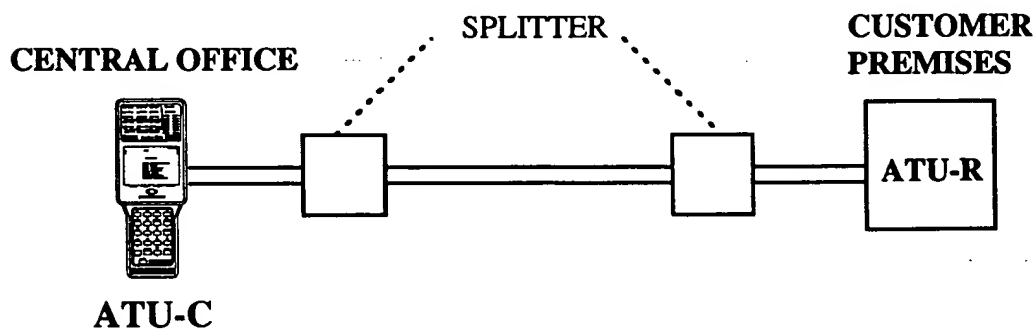
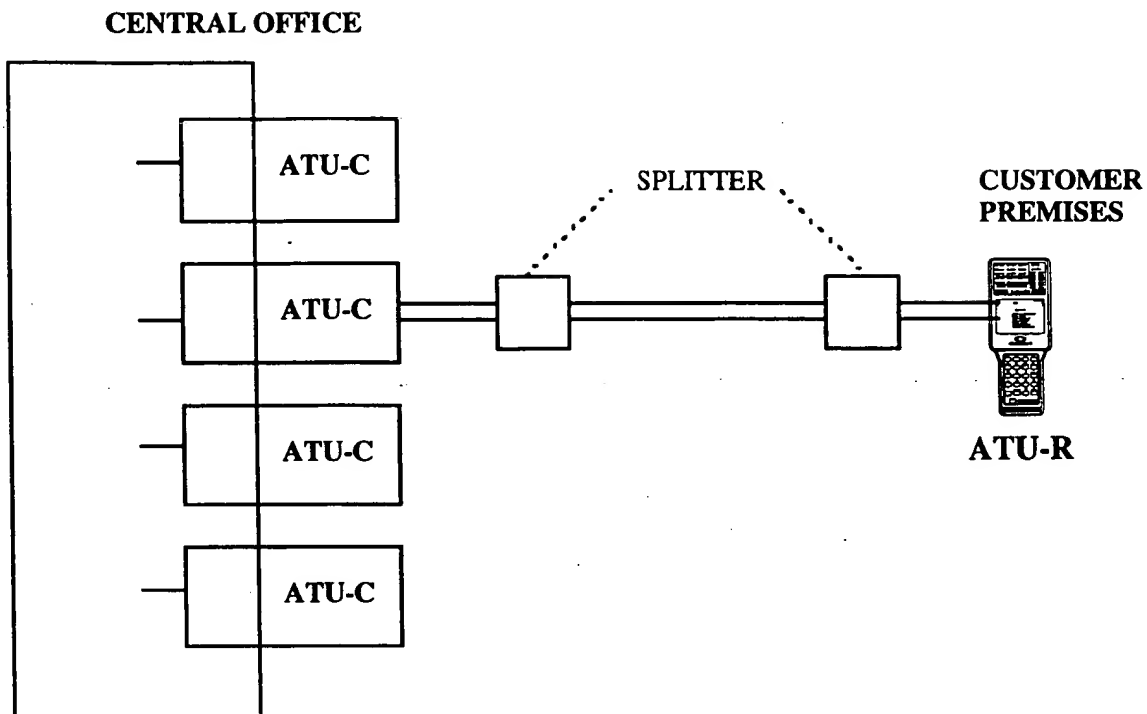
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4.4.2 ATU-R or ATU-C Function



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5.0 Functions

5.1 Layer 1 Functions:

5.1.1 Digital Multimeter

- Meters:
 - Volt DC and AC
 - Detect and Measure foreign voltages; span voltage
 - Ohm Meter
 - Span's resistance should be $> 5 \text{ M}\Omega$ between tip/ground and ring/ground
 - Capacitance
- Loop Resistance (requires two sets)
 - measures that span has continuity between CO and Customer Premises
 - determines that no physical faults exist (grounds, shorts, opens)
 - HDSL requirement: 900Ω
 - ADSL requirement: 1300Ω

5.1.2 Time Domain Reflectometer

- Detect the following based on polarity of reflected pulse:
 - Cable length
 - Load Coils
 - Bridge Taps
 - Water

5.1.3 Load Coil Detector

- Detect presence of loading coils based on Impedance vs. Frequency Plot *[Need details from R&D]*

5.1.4 Insertion Loss Measurement for DMT and fundamental frequencies of interfering services.

- Measure attenuation using two sets: Slave Unit sends tone from far end. Master unit conducts measurements.
- Measure DMT 256 frequencies, 40 kHz (ISDN U interface), 82 kHz (DDS), 96 kHz (ISDN S-Interface), 196 kHz (HDSL 2-Pair T1), 260 kHz (HDSL E1), 392 kHz (HDSL 1-Pair T1) 772 kHz (T1) 1.024 MHz (E1), or User Selectable range and step size

5.1.5 Background Noise in 10 kHz to 1.5 MHz spectrum

- Slave Unit terminates the far end
- Master unit performs measurement.
- Applicable filters (per IEEE Std 743-1995 Clause 9)
- E-Filter
 - Filter Section: High pass 3 dB down 1 kHz ; Low pass 3 dB down 50 kHz
 - For ISDN BRA DSL at an impedance of 135Ω

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- F-Filter
 - Filter Section: High pass 3 dB down: 5 kHz ; Low pass 3 dB down: 245 kHz
 - For HDSL at an impedance of 135 Ω
- G-Filter
 - Filter Section: High pass 3 dB down: 20 kHz ; Low pass 3 dB down: 1.1 MHz
 - For ADSL at an impedance of 100 Ω

5.1.6 Signal to Noise Ratio Measurement

- Measure DMT 256 frequencies, 40 kHz (ISDN U interface), 82 kHz (DDS), 96 kHz (ISDN S-Interface), 196 kHz (HDSL 2-Pair T1), 260 kHz (HDSL E1), 392 kHz (HDSL 1-Pair T1), 772 kHz (T1), 1.024 MHz (E1), or User Selectable range and step size
- Slave unit sends tone from far end, Master unit performs measurement

5.1.7 T1 Testing

- T1 BERT in HTU-C or HTU-R mode
- T1 BERT from T1 access point
- Loopback Control of HTU-C & R, CSU/NIU
- VF channel monitor from HTU-C, HTU-R, or T1 access point

5.1.8 E1 Testing

- E1 BERT in HTU-C or HTU-R mode
- E1 BERT from E1 access point
- Loopback Control of HTU-C & R; Sa Bit Loopback Control
- VF channel monitor from HTU-C, HTU-R, or E1 access point

5.2 Layer 2 Functions:

5.2.1 ADSL

- ATU-R Emulation
- ATU-C Emulation

5.2.2 HDSL

- HTU-R Emulation
- HTU-C Emulation
- HTU-C Loop Back: A regenerative loop back of the DSX-1 signal toward the network (*per MD 6100-1 document*)
- HTU-R Loop Back: A regenerative loop back of the DS1 signal toward the network (*per MD 6100-1 document*)

5.3 Layer 3 Functions:

5.3.1 IP Ping Test (*possible*)

- Engineering to research and determine feasibility; Report on available alternatives.

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6.0 Specifications

6.1 TDR

Pulse widths:

20 nS to 5 μ S

Test Signal:

1/2 Square Wave if Pulse width < 1 μ S

1/2 Sine Wave if Pulse width > 1 μ S

Amplitude:

5 V_{p-p} into 100 Ω , 10 V into open circuit

Output Impedance:

100 Ω

Velocity of Propagation:

0.4 to 0.99 in 0.01 increments

Maximum Measurable Attenuation:

Less than -80 dB (roundtrip) of 5 V [12,000 ft @ 26 AWG returned signal]

Distance Range: Dependent on cable type and condition

10 ft to 22000 ft @ 22 AWG

10 ft to 18000 ft @ 24 AWG

10 ft to 12000 ft @ 26 AWG

3 m to 6700 m @ 0.6 mm

3 m to 5400 m @ 0.5 mm

3 m to 3600 m @ 0.4 mm

Distance Accuracy: (\pm uncertainty in V_{PEAK} and Velocity of Propagation)

\pm 4 ft @ 10 ft to 1000 ft or [\pm 1 m @ 3 m to 300 m]

\pm 6 ft @ 1000 ft to 22000 ft or [\pm 2 m @ 300 m to 6700 m]

6.2 INSERTION LOSS MEASUREMENT

Sine Wave Generator

Frequency Range:

10 kHz to 1.5 MHz

Frequency Resolution:

0.1 kHz

Frequency Accuracy:

\pm 50 ppm @ (25°C), Temperature coefficient \pm 2 ppm/°C, aging \pm 10 ppm/year

Level Range:

-20 dBm to 26 dBm in 1 dBm steps

Level Accuracy (Flatness):

0.3 dB for output level > 0 dBm

0.5 dB for output level < 0 dBm

Output Impedance:

100 Ω balanced

Total Harmonic Distortion:

< -50 dB @ 10 kHz to 30 kHz

< -60 dB @ 30 kHz to 300 kHz

< -50 dB @ 300 kHz to 700 kHz

< -45 dB @ 700 kHz to 1.5 MHz

Spurious (Non-Harmonic):

< -60 dB @ 10 kHz to 1.5 MHz

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Receiver:

Measurement Method:

FFT

Frequency Range:

10 kHz to 1.5 MHz

Frequency Resolution:

1.078 kHz

* Input Impedance:

100 Ω balanced

** Can this be done in high impedance? Customer desires in-service level measurements in bridge mode.*

Level Range:

-65 dBm to 6.9 dBm

Level Accuracy:

± 0.2 dB of reading ± 0.1 dB $\times \log [0.5 V_{\text{RMS}}^2 / V_{\text{IN RMS}}^2]$ @ 10 kHz to 700 kHz

± 0.3 dB of reading ± 0.1 dB $\times \log [0.5 V_{\text{RMS}}^2 / V_{\text{IN RMS}}^2]$ @ 700 kHz to 1.5 MHz

6.3 Digital Multimeter (DMM)

Digits:

3 3/4

DC Voltage Measurement:

350 V Max

Range:

0.4 V, 4 V, 40 V, 400 V (Auto Range)

Resolution:

0.1 mV, 1 mV, 10 mV, 100 mV

Accuracy:

$\pm 0.35\%$ of range

Protection:

AC Voltage Measurement:

275 VAC Max

Detector: True RMS

Range:

4 V, 40 V, 400 V (Auto Range)

Resolution:

1 mV, 10 mV, 100 mV

Accuracy:

$\pm 0.5\%$ of range @ 50 to 500 Hz

$\pm 2.0\%$ of range @ 500 to 1 kHz

Resistance:

0.1 Ω to 10 M Ω

Range:

400 Ω , 4 k Ω , 40 k Ω , 400 k Ω , 4 M Ω , 40 M Ω (Auto Range)

Resolution:

0.1 Ω , 1 Ω , 10 Ω , 100 Ω , 1 k Ω , 10 k Ω

Accuracy:

$\pm 1\%$ of range @ 400 Ω range

$\pm 0.5\%$ of range @ 4 k Ω to 40 k Ω range

$\pm 1\%$ of range @ 400 k Ω range

$\pm 3\%$ of range @ 4 M Ω range

$\pm 3\%$ of range @ 40 M Ω range

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Capacitance:

10 pF to 40 μ F (Auto Range)

Range:

4 nF, 40 nF, 400 nF, 4 μ F, 40 μ F

Resolution:

1pF, 10pF, 100 pF, 1 nF, 10 nF

Accuracy:

$\pm 2\%$ of range

6.4 xDSL Plug In Modules

6.4.1 PairGain HDSL Module

• Functional Blocks

- PairGain HDSL module (1.5 Mbps or 2.0 Mbps)
- E1 or T1 line interface
- E1 or T1 line framer
- Voice channel monitor with volume control for: Framed T1 or E1 payload in HDSL or T1/E1 line side
 - μ or A law programmable

• Test Modes

- HTU-R or HTU-C Function
- HDSL Payload BERT (1.544 Mbps or 2.048 Mbps full rate)
- HDSL T1/E1 framed BERT (Full or fractional rate)
- T1 or E1 BERT (Full or fractional rate)
- Bit error rate tests for the following patterns:
 - Repeating: 1111, 0000, 0101, 1-in-8, 3-in-24 (T1 only)
 - Pseudo random: QRS, PRBS 2ⁿ-1: n = 6, 7, 9, 11, 15, 20, 23

• HTU-R and HTU-C Loopback codes

• HTU-C Line Power Generation implemented by external power supply.

- Per PairGain OEM-HMO-SP2-03, pages 18 and 19.
- Per Bellcore GR-1089-CORE: Voltage cannot exceed 140 volts from earth ground and line power be isolated from earth ground so there is no more than 10 milliamps conducted from any point to earth ground.

• HTU-R acceptance of line power from HTU-C

- Initial assessment is good. (Requires further investigation)

6.4.1.1 T1 Specifications

- Line Interface: 100 Ω , RJ-45: Bridge, Monitor, Term
- External Clock Interface: 100 Ω , RJ-45: 0 to -36 dB, Term only
- Internal Clock Calibration: TTL, RJ-45 pin 1 & 8 (shares the Ext Clock port)
- Framing: ESF, SF, SLC-96, Unframe
- Line Code: B8ZS, AMI
- Measurements: G.821, Line Frequency, Line Level (0 to -36 dB, ± 1 dB), FBE, CRC-6, BPV, Yellow Alarm, AIS, LOS, ...
- Voice Frequency Capability : VF Monitor, View/Send ABCD Bits, Tx dnmw, Tx Idle channel Code
- Tx clock: Ext, Rx, Intern (1.544 MHz, ± 150 ppm @ 1 ppm)
- Loopback Control: In-Band or FDL-ESF, CSU/NIU

6.4.1.2 E1 Specifications

- Line Interface: 120 Ω , RJ-45: Bridge, Monitor, Term
- External Clock Interface: 120 Ω , RJ-45: 0 to -41 dB, Term only
- Internal Clock Calibration: TTL, RJ-45 pin 1 & 8 (shares the Ext Clock port)
- Framing: PCM-30/CRC-4, PCM-31/CRC-4, Unframe

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- Line Code: HDB3
- Measurements: G.821, Line Frequency, Line Level (0 to -41 dB, ± 1 dB), FBE, CRC-4, Code Err, RAI, E-bit, AIS, LOS, ...
- Voice Frequency Capability: VF Monitor, View/Send ABCD Bits, Tx Idle channel code
- Tx clock: Ext, Rx, Intern (2.048 MHz, ± 150 ppm @ 1 ppm)
- Loopback Control by Sa bits
- View/Send Sa bits

6.4.2 Alcatel ADSL Module

- R3.0/3.1 chip set implementation
- ATU-R or ATU-C Function

6.4.3 Other modules to be announced

6.5 Connectors:

Base Unit: Single Bantam
PairGain Module: Three RJ-45 (HDSL, T1 or E1, Ext Clock)
Alcatel Module: Single RJ-45
Serial Port: DIN 8 to RS232C
DC power jack

6.6 Status Indicators

LEDs

18 bi-color

6.7 General

Size:

10.5 cm x 6 cm x 27 cm [4" x 2.4" x 10.5"]

Weight:

1.3 kg [2.8 lb]

Display:

32 x 16 graphic LCD with backlight

Battery:

Rechargeable, field-replaceable 9-cell NimH pack
5 hours of continuous use (nominal)

Charger:

Universal 100 - 240 VAC adapter with IEC power cable connector

6.8 Environmental

Operating Temperature:

0 °C to 50 °C [32 °F to 122 °F]

Storage Temperature:

-20 °C to 70 °C [-4 °F to 158 °F]

Humidity:

5 % to 90 % noncondensing

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6.9 Electrical Safety [per Bellcore GR-1089-CORE]

6.9.1 Voltage-Limiting Protector: 3-mil-gap carbon block

- Has upper 3-sigma limiting voltage of 1000V peak under surge conditions and 600 Vrms (800V peak) at 60 Hz.
- Equipment protected by carbon blocks can withstand voltages up to these levels.

6.9.2 Current-Limiting Protector:

- Protector should have a continuous carry-current rating of 350 mA and be applied on "the equipment side of the voltage limiting protector."

6.9.3 Fuse Links

- Consists of 24 or 26 AWG Cu cable and coordinates with the current-carrying capability of primary voltage-limiting protector.

6.9.4 AC Power Fault and Lightning

- Should comply to GR-1089-CORE Section 4.5.7, Table 4-2 "First Level Lightning Surge (Telecommunications Port)"
- Should comply to GR-1089-CORE Section 4.5.10, Table 4-5 "First Level Lightning Surge (AC Power Port)"
- Should comply to GR-1089-CORE Section 4.5.12, Table 4-7 "First Level AC Power Fault (Telecommunications Port)"

6.10 EMI Compatibility [per Bellcore GR-1089-CORE]

6.10.1 FCC Part 15, Class A: Digital Device for US; CE for Europe

6.10.2 EN55022 (radiated emissions)

6.10.3 EN55024-2 (electrostatic discharge)

6.10.4 EN55024-3 (radiated immunity)

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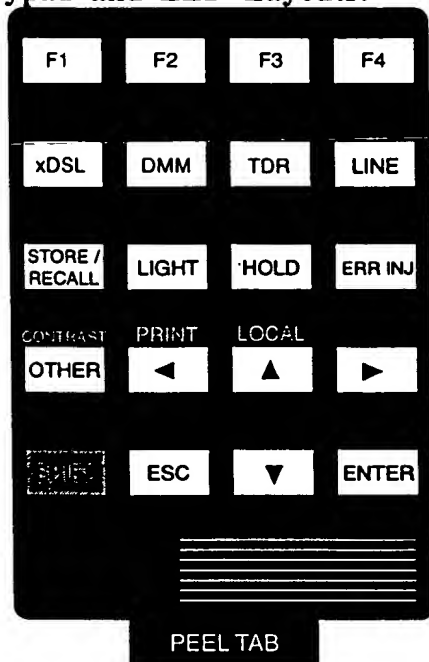
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7.0 User Interface

7.1 Keypad and LED Layouts:



xDSL: Access HDSL, ADSL, T1, E1 functions

DMM : Access DMM and Load Coil Test

TDR: Access TDR testing

LINE: Access LINE testing

(Insertion Loss, S/N, Background Noise, Loop Resistance)

STORE/RECALL: For storing and recalling results;

1. Can be pressed at anytime

2. Can store any results

HOLD : Freezes screen during measurement and displays blinking green HOLD LED

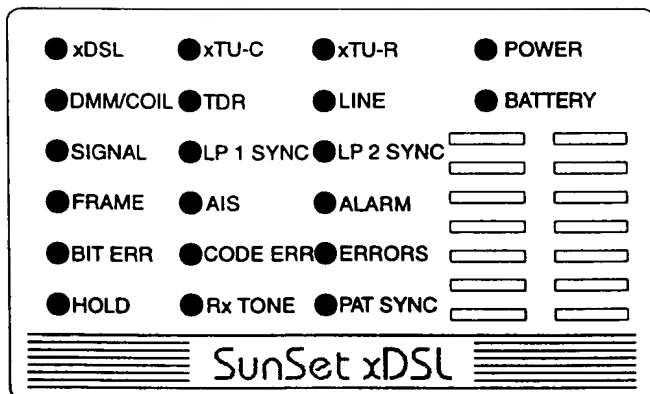
ERR INJ: Inject errors

OTHER: To access OTHER SETUP functions (i.e. Erase NV RAM, Date & Time, etc.)

ESC: To go to previous menu; Ultimate destination is first menu of function selected

PRINT: (Under investigation)

LOCAL: (Under investigation)



LP 1 SYNC: HDSL only

Green when: 1) Synch achieved for HDSL Loop1

2) Successful Loop Up in T1/E1 Loopback Control

Red: No synch for HDSL LP1; Loop Dn in T1/E1

Loopback Control

LP 2 SYNC: HDSL only

Green when: Synch achieved for HDSL Loop2

Red: No synch for HDSL L2

ERRORS: Layer 1; Layers 2&3 (under investigation)

ALARM: Layer 1; Layer 2 (under investigation)

PAT SYNC: Layer 1&2 BERT

xDSL: Green when User is in xDSL mode;
Remains off otherwise

xtU-C: Green: User is in ATU-C or HTU-C mode
Red: Link Down with xTU-R

xtU-R: Green: ATU-R or HTU-R mode
Red: Link Down with xTU-C

DMM: Green: User is in DMM or Load Coil
Test mode; Remains off otherwise

TDR: Green when User is in TDR mode;
Remains off otherwise

LINE: Green when User is in LINE mode;
Remains off otherwise

SIGNAL: General LED- Applies to Layers 1, 2, and 3
Red: No turn up in process ; No signal

Green : Turn up complete ; Signal

FRAME: General LED- Applies to Layer1, 2, and 3
1. Blinks green during HDSL/ADSL turnup.

2. Solid Green when complete

2. Red if open, fails, or not in process.

Rx TONE: For Master Unit

In LINE Menus- lights green when Tone is
detected from Slave unit

AIS: Loss of signal for E1/T1 payload

BIT ERROR: Layer 1

CODE ERROR: Layer 1

HOLD: Blinks green when test set is in HOLD mode

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SunSet xDSL

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7.2 Menu Tree

xDSL

HDSL/T1/E1

- TEST CONFIGURATION
- VIEW SPAN STATUS
- VIEW PERFORMANCE DATA
- T1 OR E1 BASIC MEASUREMENTS
- LOOP BACK CONTROL
- HDSL SYSTEM SETTINGS

ADSL

- SETUP
- MODEM STATUS
 - GENERAL STATUS
 - BIT GRAPHIC/TABLE
 - CARRIER MASK
 - CLOSE LINK
 - OPEN LINK
 - ATU MODULE SELF TEST
- LINK MEASUREMENTS
- PING

DMM

- DCV
- ACV
- OHM
- CAP
- LOAD COIL DETECTOR

TDR

LINE

- MASTER OR SLAVE
- INSERTION LOSS
- SIGNAL TO NOISE
- BACKGROUND NOISE
- LOOP RESISTANCE

STORE/RECALL

OTHER

- DEFAULT SETTINGS
- TEST PARAMETERS
- GENERAL CONFIG
- ERASE NV RAM
- VERSION/OPTION

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SunSet xDSL

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7.3 Screens

The MAIN MENU that is prevalent in current SunSets does not exist for the SunSet xDSL. Upon power up, an Introduction Screen appears for 2 to 3 seconds. Then the DMM Screen 1 will appear as the default screen (User can select another default screen in OTHER SETUP). Users can choose a different function at any time by pressing the appropriate key.

```
12345678901234567890123456789012
1 12:30:55 1
2
3
4
5 (Sunrise Logo Here)
6
7
8 SunWare
9 xDSL
0
1
2
3
4
5 Version 0.00 S/N 0001
6 SUNRISE TELECOM, Inc. 1997
12345678901234567890123456789012
```

INTRODUCTION SCREEN

1. Appears after power up for 2-3 seconds.
2. Then DMM Screen 1 appears as default.

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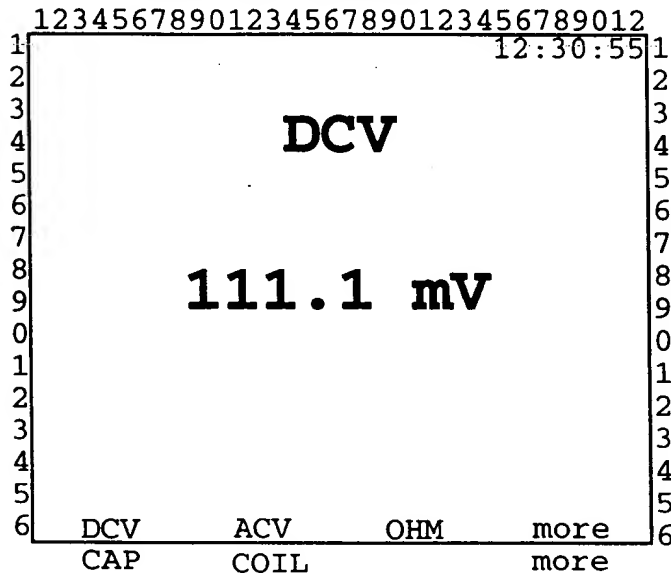
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7.3.1 Digital Multimeter Screens

When the User pushes the DMM key, the following screen appears :

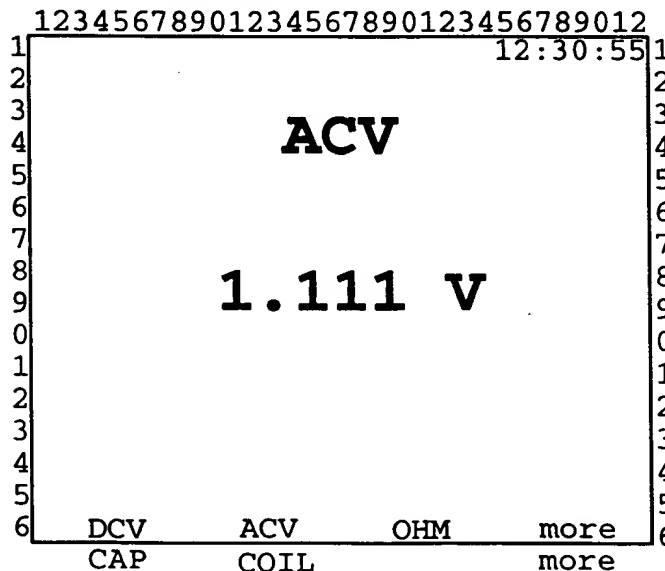
DMM 1 (Note: Auto Range, so other possible readings are:
1.000 V, 10.00 V, 100.0 V)



1. F-KEYS:
DCV, ACV, OHM, CAP, COIL

1. Pressing an F-Key for another meter will immediately change to that mode and a reading will be displayed.
2. The DMM key will lead to the last DMM screen User was in.
3. Load Coil Detector Screen will be included in next revision of MRD.

DMM 2 (Note: Auto Range, so other possible readings are:
40.00 V, 400 V)



1. F-KEYS:
DCV, ACV, OHM, CAP, COIL

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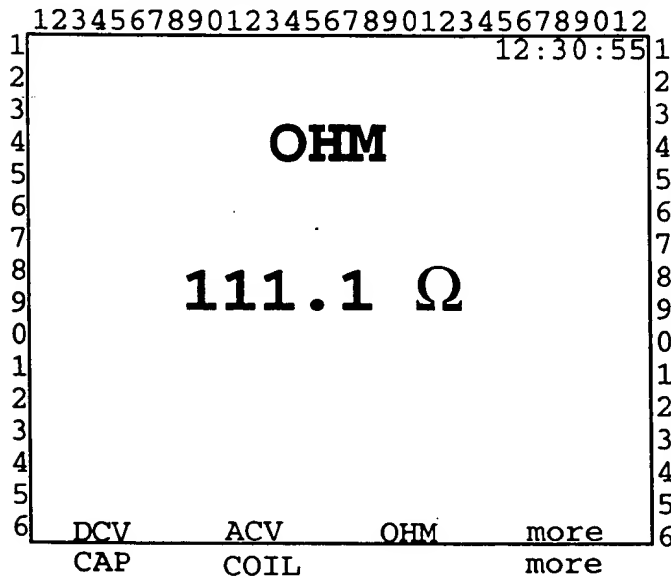
File name: F10027

SunSet xDSL

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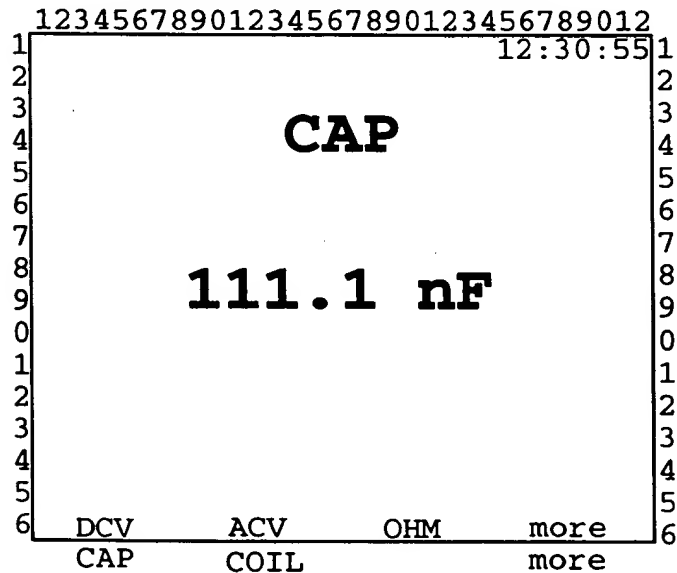
REV: A

DMM 3 (Note: Auto Range, so other possible readings are:
4000Ω, 40.00 kΩ, 400.0 kΩ, 4000 kΩ, 40.00 MΩ)



1. F-KEYS:
DCV, ACV, OHM, CAP, COIL

DMM 4 (Note: Auto Range, so other possible readings are:
50.00 nF, 500.0 nF, 5.000 uF, 50.00 uF)



1. F-KEYS:
DCV, ACV, OHM, CAP, COIL

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SunSet xDSL

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7.3.2 TDR Screens

TDR 1a: English Units

```
12345678901234567890123456789012
1                                     12:30:55
2
3   TIME DOMAIN REFLECTOMETER
4
5 UNITS: ENGLISH
6
7   GAUGE           : 26 AWG
8   PROP VELOCITY   : 0.60
9   CABLE LENGTH    : 100 FT
10
11
12
13
14   Press ENTER key to START
15
16
12345678901234567890123456789012
```

1. Line 5 display for UNIT is designated in the DEFAULT SETTINGS screen. This selection remains permanent until changed by the User (immune to NV.RAM.erase)

2.GAUGE

F-keys:

19 AWG, 22 AWG, 24 AWG, 26 AWG

3. Propagation Velocity is adjustable in .01 or .1 increments between 0.4 to 0.99.

F-keys:

+.01, -.01, +.1, -.1

4. Cable Length selection transmits appropriate Pulse Width (Note: Per R&D, Pulse Width cannot be adjusted in active TDR screen)

F-keys: (Units = ft)

+10, -10, +100, more, -100, +1000, -1000, more

5. Pressing the ENTER key sends the test signal and leads to the TDR 2 Screen.

TDR 1b: Metric Units

```
12345678901234567890123456789012
1                                     12:30:55
2
3   TIME DOMAIN REFLECTOMETER
4
5 UNITS: METRIC
6
7   GAUGE           : 0.4 mm
8   PROP VELOCITY   : 0.60
9   CABLE LENGTH    : 10 m
10
11
12
13
14   Press ENTER key to START
15
16
12345678901234567890123456789012
```

1.GAUGE

F-keys:

0.4 mm, 0.6 mm, 0.8 mm

2. Propagation Velocity is adjustable in .01 or .1 increments between 0.4 to 0.99.

F-keys:

+.01, -.01, +.1, -.1

3. Cable Length

F-keys: (Units = m)

+10, -10, +100, more, -100, +1000, -1000, more

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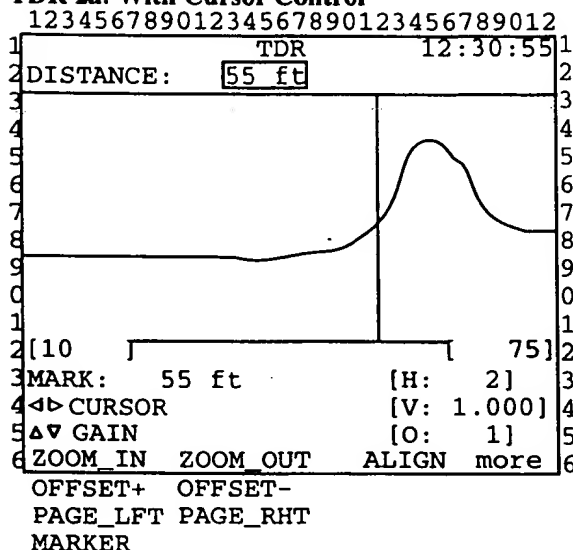
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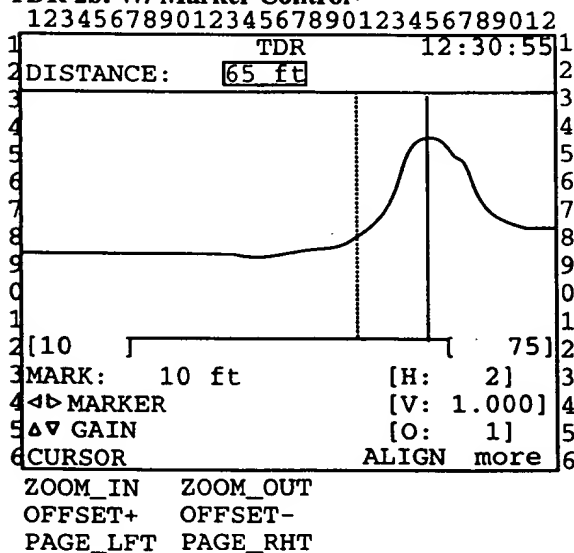
REV: A

TDR 2a: With Cursor Control



1. The ENTER key from the previous screen leads to this screen. The reflection is shown immediately.
2. ESC Key leads to TDR 1 screen
3. Active TDR screen is 64 pixels by 184 pixels.
User Control:
 1. Tracking Cursor controlled by the Right and Left arrow keys. Shown in Line 14 <> Cursor.
 - a. Distance display is shown in Line 2 corresponding to the cursor position (in reverse video).
 - b. Horizontal scale is shown on Line 12.
 2. Vertical Gain is adjustable with Up and Down arrow keys.
 - a. Scale: 0.125, 0.25, 0.5, 1, 2, 4, 8, 16, 32 vertical units; Display is 1 pixel per chosen vertical units.
 - b. Gain Scale is shown in Line 14.
 3. Horizontal Zoom is adjustable by F-keys
ZOOM_IN and ZOOM_OUT:
Scale: 1, 2, 4, 8, 16, 32, 64, 128, 256 ns
Display is 1 pixel per chosen ns
Zoom Scale is shown in Line 13.
4. Vertical Local Offset is adjustable by F-Keys
OFFSET+ and OFFSET-
Scale: +/- 256 by increments of 2.
Offset is shown in Line 15.
Note: When user takes the cursor to the center of a reflected pulse that goes out of vertical screen range, then an automatic offset adjustment is made to bring pulse within screen parameters.

TDR 2b: W/ Marker Control



5. PAGE_LFT and PAGE_RHT F-Keys moves screen by 1/2 page right or left.
6. ALIGN F-Key: Used for reflections that continue beyond screen horizontally.
 - a. Based on the cursor position, will shift the display horizontally to show more of reflected pulse- the tracking cursor ends up in far left hand side.
7. MARKER
 - a. Yields Left/Right arrow key to the Marker cursor (dotted vertical line).
This is indicated by Line 14 <> Marker
 - b. Distance from Marker to Cursor is shown in Line 13.
 - c. To regain Cursor control, User can push the CURSOR F-key. Line 14 changes to <> Cursor.
 - d. Note, Marker initially resides at the far left. Hence initial Marker reading (Line 13) = Distance Reading (Line 2).
8. All F-keys appear in Reverse Video for more clarity.
9. User can store the waveform or recall a saved waveform by pressing the STORE/RECALL key.

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7.3.3 Insertion Loss Screens

LINE MEAS 1a:

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3 LINE MEASUREMENT
4 MODE: MASTER
5
6 RESULT TYPE:
7
8 INSERTION LOSS
9 SIGNAL TO NOISE
0 BACKGROUND NOISE
1 LOOP RESISTANCE
2
3
4
5
6 MASTER SLAVE
12345678901234567890123456789012
```

LINE MEAS 1b:

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3 LINE MEASUREMENT
4 MODE: MASTER
5
6 RESULT TYPE:
7
8 INSERTION LOSS
9 SIGNAL TO NOISE
0 BACKGROUND NOISE
1 LOOP RESISTANCE
2
3
4
5
6
12345678901234567890123456789012
```

1. When the User pushes the LINE key, the LINE MEAS 1 Screen appears.
2. The User must designate the mode:
F1: MASTER (Measure Unit)
F2: SLAVE (Slave Unit)
3. The User can then scroll up and down among the Result Type choices. Pressing the ENTER key takes the User to the selected measurement screen. The User can return to the LINE MEAS 1 screen by pressing the ESC key.

INSERT LOSS 1a:

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >                                     Idle< 2
3
4 INSERTION LOSS
5
6 ADSL DMT 256
7 HDSL T1 196 kHz
8 HDSL T1 392 kHz
9 HDSL E1 260 kHz
0 ISDN U 40 kHz
1 ISDN S 96 kHz
2 DDS 82 kHz
3 T1 772 kHz
4 E1 1.024 MHz
5
6 START
12345678901234567890123456789012
```

1. START F3 key or the ENTER key begins measurement by initiating the handshake between the Master set and the Slave set.

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1. Pressing the F3 START key or the ENTER key will initiate the handshake between the Master unit and the Slave unit.
2. The following messages will appear in the Status Indicator at the Top/Right of the screen:
 - "Idle"; (Press START F3 Key or ENTER key), "Connecting"; "Connected"The Slave unit will send the tone(s) designated by the xDSL unit.
 - "Testing" will display on Top/Left
3. The graphical results will automatically be displayed as they become available.

INSERT LOSS 1a:

```
12345678901234567890123456789012
1                                     12:30:55
2 >                                     Idle<
3
4      INSERTION LOSS
5
6      ADSL DMT 256
7      HDSL T1 196 kHz
8      HDSL T1 392 kHz
9      HDSL E1 260 kHz
0      ISDN U 40 kHz
1      ISDN S 96 kHz
2      DDS 82 kHz
3      T1 772 kHz
4      E1 1.024 MHz
5
6                                     START
12345678901234567890123456789012
```

INSERT LOSS 1b:

```
12345678901234567890123456789012
1                                     12:30:55
2 >                                     Connecting<
3
4      INSERTION LOSS
5
6      ADSL DMT 256
7      HDSL T1 196 kHz
8      HDSL T1 392 kHz
9      HDSL E1 260 kHz
0      ISDN U 40 kHz
1      ISDN S 96 kHz
2      DDS 82 kHz
3      T1 772 kHz
4      E1 1.024 MHz
5
6
12345678901234567890123456789012
```

INSERT LOSS 2a:

```
12345678901234567890123456789012
1                                     12:30:55
2 >Testing                                     Connected<
3
4      INSERTION LOSS
5      Tone 125: 500 kHz : -23 dB
6      Tone 126: 504 kHz : -22 dB
7
8      70
9      60
0      50
1      40
2      30
3      20
4      10
5      0
6
7      -dB
8
9      1
0
1      256
2
3      TONE #
4
5
6
12345678901234567890123456789012
```

1. The Graphical results are displayed as soon as measurement is begun and results become available.
2. Bit Mapping used for Graph of DMT 256 Tones:
 - Horizontal Axis:
 - a. 1 horizontal dot column per 2 tones (Full range displayed)
 - b. 8.6 kHz/dot x 6 dots/char. = 51.6 kHz per character
 - c. Both vertical dots graphed if they are at separate vertical points
 - Vertical Axis:
 - a. 1 dB per dot
 - b. 8 dots per character x 9 characters = 72 dB max.

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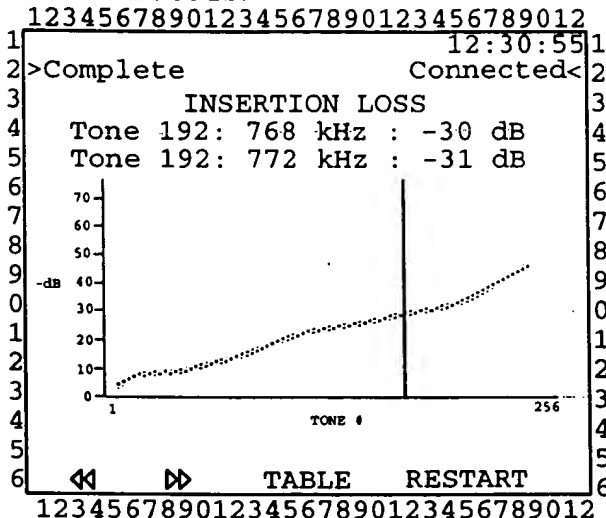
File name: F10027

SunSet xDSL

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INSERT LOSS 2b:



1. F-Keys are presented when all measurements are complete, as indicated by the "Complete" message on the Top/Left Status indicator.
2. Control of vertical cursor is by Left/Right Arrow keys or << F1 key and >> F2 key for fast cursor control.
 - a. Corresponding measurement is displayed at top of screen
 - b. It should take 3 seconds to go from left hand edge to the right hand edge.
3. F3 TABLE key leads to Tabular Results
4. F4 RESTART key restarts measurement

INSERT LOSS 3:

12345678901234567890123456789012

12:30:55

>Complete Connected<

RESULTS - INSERTION LOSS

kHz	-dB	kHz	-dB	kHz	-dB
10	5	50	5	94	7
14	6	54	6	98	7
18	5	58	5	102	6
22	6	62	6	106	7
26	5	66	5	110	8
30	6	70	6	114	8
34	5	74	5	118	7
38	6	78	6	122	8
40	5	82	5	126	8
42	6	86	6	130	8
46	5	90	5	134	9

PG-UP PG-DN GRAPH RESTART

12345678901234567890123456789012

Tabular Results:

1. 33 frequencies displayed per pag; 8 pages total
2. F3 GRAPH key takes User back to the Graphical Results Screen
3. F4 RESTART key restarts measurement

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7.3.4 Signal to Noise Screens

LINE MEAS 1:

```
12345678901234567890123456789012
1                                     12:30:55
2
3      LINE MEASUREMENT
4      MODE: MASTER
5
6      RESULT TYPE:
7
8      INSERTION LOSS
9      SIGNAL TO NOISE
0      BACKGROUND NOISE
1      LOOP RESISTANCE
2
3
4
5
6
12345678901234567890123456789012
```

S/N 1a:

```
12345678901234567890123456789012
1                                     12:30:55
2                                     Idle<
3
4      SIGNAL TO NOISE
5
6      ADSL DMT 256
7      HDSL T1 196 kHz
8      HDSL T1 392 kHz
9      HDSL E1 260 kHz
0      ISDN U 40 kHz
1      ISDN S 96 kHz
2      DDS 82 kHz
3      T1 772 kHz
4      E1 1.024 MHz
5
6      START
12345678901234567890123456789012
```

S/N 1b:

```
12345678901234567890123456789012
1                                     12:30:55
2                                     Connecting<
3
4      SIGNAL TO NOISE
5
6      ADSL DMT 256
7      HDSL T1 196 kHz
8      HDSL T1 392 kHz
9      HDSL E1 260 kHz
0      ISDN U 40 kHz
1      ISDN S 96 kHz
2      DDS 82 kHz
3      T1 772 kHz
4      E1 1.024 MHz
5
6
12345678901234567890123456789012
```

S/N 2:

```
12345678901234567890123456789012
1                                     12:30:55
2                                     Complete Connected<
3      RESULTS - SIGNAL TO NOISE
4
5      FREQUENCY: 196 kHz
6      SIG/NOISE: 37 dB
7
8
9
0
1
2
3
4
5
6      RESTART
12345678901234567890123456789012
```

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7.3.5 Background Noise Screens

LINE MEAS 1:

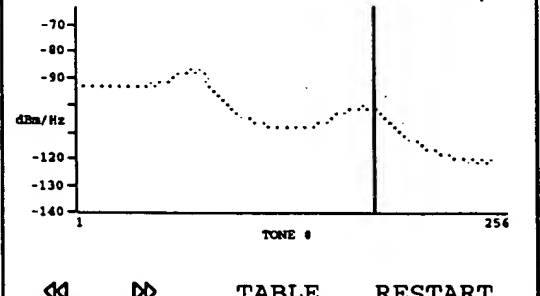
```
12345678901234567890123456789012
12:30:55
1
2
3 LINE MEASUREMENT
4 MODE: MASTER
5
6 RESULT TYPE:
7
8 INSERTION LOSS
9 SIGNAL TO NOISE
0 BACKGROUND NOISE
1 LOOP RESISTANCE
2
3
4
5
6
12345678901234567890123456789012
```

BG 1a:

```
12345678901234567890123456789012
12:30:55
1
2 > Idle <
3
4 BACKGROUND NOISE
5
6
7 TYPE: DMT
8
9
0
1
2
3
4
5
6
DMT E F G
12345678901234567890123456789012
```

BG 2:

```
12345678901234567890123456789012
12:30:55
1
2 >Complete Connected<
3
4 DMT BACKGROUND NOISE
5 Tone 192: 772 kHz : -102 dBm/Hz
6 Tone 193: 776 kHz : -105 dBm/Hz
7
8
9
0
1
2
3
4
5
6
12345678901234567890123456789012
```



12345678901234567890123456789012

BG 3a:

```
12345678901234567890123456789012
12:30:55
1
2 >Complete Connected<
3
4 DMT BACKGROUND NOISE
5 kHz (dBm/Hz) kHz (dBm/Hz) kHz (dBm/Hz)
6 4.3 -140
7 8.6 -120
8 12.9 -100
9
0
1
2
3
4
5
6
PG-UP PG-DN GRAPH RESTART
12345678901234567890123456789012
```

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File name: F10027

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REV: A

LINE MEAS 1:

12345678901234567890123456789012

12:30:55

LINE MEASUREMENT

MODE: MASTER

RESULT TYPE:

INSERTION LOSS

SIGNAL TO NOISE

BACKGROUND NOISE

LOOP RESISTANCE

BG 1b:

12345678901234567890123456789012

12:30:55

Idle<

BACKGROUND NOISE

TYPE: E

DMT

E

F

G

12345678901234567890123456789012

BG 3b

12345678901234567890123456789012

12:30:55

>Complete

Connected<

E-Filter BACKGROUND NOISE

Noise: -42 dBm

BG 3c:

12345678901234567890123456789012

12:30:55

>Complete

Connected<

F-Filter BACKGROUND NOISE

Noise: -42 dBm

12345678901234567890123456789012

BG 3d

12345678901234567890123456789012

12:30:55

>Complete

Connected<

G-Filter BACKGROUND NOISE

Noise: -42 dBm

12345678901234567890123456789012

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REV: A

7.3.6 Loop Resistance Screens

LINE MEAS 1:

```
12345678901234567890123456789012
1                                     12:30:55
2
3      LINE MEASUREMENT
4      MODE: MASTER
5
6      RESULT TYPE:
7
8      INSERTION LOSS
9      SIGNAL TO NOISE
0      BACKGROUND NOISE
1      LOOP RESISTANCE
2
3
4
5
6
12345678901234567890123456789012
```

LOOP 1a:

```
12345678901234567890123456789012
1                                     12:30:55
2                                     Connecting<
3
4      LOOP RESISTANCE
5
6
7
8
9
0
1
2
3
4
5
6      RESTART
12345678901234567890123456789012
```

LOOP 1b:

```
12345678901234567890123456789012
1                                     12:30:55
2                                     Connected<
3
4      LOOP RESISTANCE
5
6      1300 Ω
7
8
9
0
1
2
3
4
5
6      RESTART
12345678901234567890123456789012
```

LOOP 1c:

```
12345678901234567890123456789012
1                                     12:30:55
2                                     >No Response Connecting<
3
4      LOOP RESISTANCE
5
6
7      WARNING:
8      FAR END NO RESPONSE
9
0
1
2
3
4
5
6      RESTART
12345678901234567890123456789012
```

1. In the LINE MEASUREMENT menu, scrolling to LOOP RESISTANCE and pressing the ENTER key brings user to the above two screens.
2. Measurement of Tip to Ring Resistance is automatic as Slave unit shorts the far end.
3. User can go back to the LINE MEASUREMENT Main Menu by pressing the ESC key.
4. User can press the RESTART F1 key to perform another measurement.
5. User can also press any functionality at any time to escape out.
6. In the case of FAR END NO RESPONSE, set displays warning message.

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7.3.7 HDSL Screens

xDSL Main Menu

1	12345678901234567890123456789012	12:30:55	1
2			2
3	xDSL Testing		3
4			4
5	→ HDSL/T1/E1		5
6	ADSL		6
7			7
8			8
9			9
0			0
1			1
2			2
3			3
4			4
5			5
6	12345678901234567890123456789012		6

HDSL Main Menu

1	12345678901234567890123456789012	12:30:55	1
2			2
3	HDSL MAIN MENU		3
4			4
5	TEST CONFIGURATION		5
6	VIEW SPAN STATUS		6
7	VIEW PERFORMANCE DATA		7
8	T1 BASIC MEASUREMENTS		8
9	LOOP BACK CONTROL		9
0	HDSL SYSTEM SETTINGS		0
1			1
2			2
3			3
4			4
5			5
6	12345678901234567890123456789012		6

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SunSet xDSL

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REV: A

T1 HDSL:HTU-C

```
12345678901234567890123456789012
12:30:55
HDSL TEST CONFIGURATION
MODE : HTU-C
PAYLOAD: T1

T1 SETUP
Rx LEVEL : N/A
FRAME : N/A
LINE CODE : N/A
Tx CLOCK : N/A
TEST RATE: 1.544 M
PATTERN : QRS
```

1. Pressing the ESC key goes to previous menu
2. F-Key Choices:
TYPE: HTU-C, HTU-R, T1
PAYLOAD: T1 (default)
T1 Setup:
Rx LEVEL: TERM, BRIDGE, MONITOR
FRAME: ESF, SF-D4, SLC96, UNFRAME
LINE CODE: B8ZS, AMI, AUTO
Tx CLOCK: INTERN, EXTERN, LOOP
TEST RATE: 1.544M, Nx64k
PATTERN:
T1: QRS, 1-in-8, 3-in-24, 1111, 0000, 0101, 2E6, 2E7, 2E9, 2E11, 2E15, 2E23

T1 HDSL:HTU-R

```
12345678901234567890123456789012
12:30:55
HDSL TEST CONFIGURATION
MODE : HTU-R
PAYLOAD: T1

T1 SETUP
Rx LEVEL : N/A
FRAME : N/A
LINE CODE : N/A
Tx CLOCK : N/A
TEST RATE: 1.544 M
PATTERN : QRS
```

1. Pressing the ESC key goes to previous menu
2. F-Key Choices:
TYPE: HTU-C, HTU-R, T1
PAYLOAD: T1 (default)
T1 Setup:
Rx LEVEL: TERM, BRIDGE, MONITOR
FRAME: ESF, SF-D4, SLC96, UNFRAME
LINE CODE: B8ZS, AMI, ATUO
Tx CLOCK: INTERN, EXTERN, LOOP
TEST RATE: 1.544M, Nx64k
PATTERN:
T1: QRS, 1-in-8, 3-in-24, 1111, 0000, 0101, 2E6, 2E7, 2E9, 2E11, 2E15, 2E23

T1 HDSL:HTU-C

```
12345678901234567890123456789012
12:30:55
HDSL TEST CONFIGURATION
MODE : T1
PAYLOAD: T1

T1 SETUP
Rx LEVEL : TERM
FRAME : ESF
LINE CODE : B8ZS
Tx CLOCK : INTERN
TEST RATE: 1.544 M
PATTERN : QRS
```

1. Pressing the ESC key goes to previous menu
2. F-Key Choices:
TYPE: HTU-C, HTU-R, T1
PAYLOAD: T1 (default)
T1 Setup:
Rx LEVEL: TERM, BRIDGE, MONITOR
FRAME: ESF, SF-D4, SLC96, UNFRAME
LINE CODE: B8ZS, AMI, AUTO
Tx CLOCK: INTERN, EXTERN, LOOP
TEST RATE: 1.544M, Nx64k
PATTERN:
T1: QRS, 1-in-8, 3-in-24, 1111, 0000, 0101, 2E6, 2E7, 2E9, 2E11, 2E15, 2E23

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File name: F10027

SunSet xDSL

MRD-10000-001

REV: A

HDSL Main Menu

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      HDSL MAIN MENU
4
5      TEST CONFIGURATION
6      VIEW SPAN STATUS
7      VIEW PERFORMANCE DATA
8      T1 BASIC MEASUREMENTS
9      LOOP BACK CONTROL
0      HDSL SYSTEM SETTINGS
1
2
3
4
5
6
12345678901234567890123456789012
```

HDSL: View Span Status 1

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      VIEW SPAN STATUS
4
5      [HTU-C]
6
7      HDSL 1      HDSL 2
8CUR MARGIN :      21      21
9MIN MARGIN :      21      21
0MAX MARGIN :      22      22
1PULSE ATTN :      00      00
2PPM OFFSET :      00      00
324 HR ES   :      00000    00000
424 HR UAS  :      00000    00000
5
6      PAGE-UP  PAGE-DN
12345678901234567890123456789012
```

HDSL: View Span Status 2

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      VIEW SPAN STATUS
4
5      [HTU-R]
6
7      HDSL 1      HDSL 2
8CUR MARGIN :      21      21
9MIN MARGIN :      21      21
0MAX MARGIN :      22      22
1PULSE ATTN :      00      00
2PPM OFFSET :      00      00
324 HR ES   :      00000    00000
424 HR UAS  :      00000    00000
5
6      PAGE-UP  PAGE-DN
12345678901234567890123456789012
```

HDSL: View Span Status 3

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      VIEW SPAN STATUS
4      DS1 STATUS
5
6      HTU-C      HTU-R
724HR BPV SEC: 00000    00000
824HR UAS   : 00000    00000
9FRAME TYPE : SF      SF
0CODE TYPE  : B8ZS    B8ZS
1
2
3
4
5
6      PAGE-UP  PAGE-DN
12345678901234567890123456789012
```

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SunSet xDSL

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REV: A

HDSL: View Span Status 4

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      VIEW SPAN STATUS
4      ALARMS DETECTED
5
6 LLOS          HDSL 1 ES
7 RLOS          HDSL 2 ES
8 LOSW1         DS1 BPV
9 LOSW2         LAI SEC
0 MARGIN L1     RAI SEC
1 MARGIN L2     NONE
2 CHAN REV
3
4
5
6 PAGE-UP PAGE-DN
12345678901234567890123456789012
```

1.DETECTED ALARM DISPLAYED IN
REVERSE VIDEO

HDSL: View Span Status 5

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      VIEW SPAN STATUS
4      ALARM HISTORY
5
6      TYPE          CURRENT      COUNT
7 DS1-HTUC LOS      OK           000
8 DS1-HTUR LOS      ALARM        001
9 LOSW HDSL 1       OK           000
0 LOSW HDSL 2       ALARM        005
1 ES HDSL 1         OK           000
2 ES HDSL 2         OK           000
3 MARGIN HDSL 1     OK           000
4 MARGIN HDSL 2     OK           000
5
6 PAGE-UP PAGE-DN
12345678901234567890123456789012
```

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SunSet xDSL

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REV: A

HDSL Main Menu

```
12345678901234567890123456789012
1                                     12:30:55
2
3      HDSL MAIN MENU
4
5      TEST CONFIGURATION
6      VIEW SPAN STATUS
7      VIEW PERFORMANCE DATA
8      T1 BASIC MEASUREMENTS
9      LOOP BACK CONTROL
0      HDSL SYSTEM SETTINGS
1
2
3
4
5
6
12345678901234567890123456789012
```

HDSL Perform 1: HDSL L1

```
12345678901234567890123456789012
1                                     12:30:55
2
3      PERFORMANCE DATA
4      ERROR SEC / UNAVAILABLE SEC
5      [HDSL LOOP 1]
6      HTU-C      HTU-R
7 05:45 000/000 000/000
8 06:00 000/000 000/000
9 06:15 000/000 000/000
0 06:30 000/000 000/000
1 06:45 000/000 000/000
2 07:00 000/000 000/000
3 07:15 000/000 000/000
4 07:30 000/000 000/000
5
6 PAGE-UP PAGE-DN HDSL2 DS1
12345678901234567890123456789012
```

HDSL Perform 2: HDSL L2

```
12345678901234567890123456789012
1                                     12:30:55
2
3      PERFORMANCE DATA
4      ERROR SEC / UNAVAILABLE SEC
5      [HDSL LOOP 2]
6      HTU-C      HTU-R
7 05:45 000/000 000/000
8 06:00 000/000 000/000
9 06:15 000/000 000/000
0 06:30 000/000 000/000
1 06:45 000/000 000/000
2 07:00 000/000 000/000
3 07:15 000/000 000/000
4 07:30 000/000 000/000
5
6 PAGE-UP PAGE-DN HDSL1 DS1
12345678901234567890123456789012
```

HDSL Perform 3: DS1

```
12345678901234567890123456789012
1                                     12:30:55
2
3      PERFORMANCE DATA
4      ERROR SEC / UNAVAILABLE SEC
5      [DS1]
6      HTU-C      HTU-R
7 05:45 000/000 000/000
8 06:00 000/000 000/000
9 06:15 000/000 000/000
0 06:30 000/000 000/000
1 06:45 000/000 000/000
2 07:00 000/000 000/000
3 07:15 000/000 000/000
4 07:30 000/000 000/000
5
6 PAGE-UP PAGE-DN HDSL1 HDSL2
12345678901234567890123456789012
```

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SunSet xDSL

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REV: A

HDSL Perform 4: HDSL L1

```

12345678901234567890123456789012
1                                     12:30:55
2
3      7-DAY PERFORMANCE HISTORY
4      ERROR SEC / UNAVAILABLE SEC
5      [HDSL LOOP 1]
6      HTU-C          HTU-C
7 12/02/97 00000/00000 00000/00000
8 12/28/97 00000/00000 00000/00000
9 12/29/97 00000/00000 00000/00000
0 12/30/97 00000/00000 00000/00000
1 12/31/97 00000/00000 00000/00000
2 01/01/98 00000/00000 00000/00000
3 01/02/98 00000/00000 00000/00000
4 CURRENT 00000/00000 00000/00000
5
6 PAGE-UP PAGE-DN HDSL2 DS1
12345678901234567890123456789012
  
```

HDSL Perform 5 HDSL L2

```

12345678901234567890123456789012
1                                     12:30:55
2
3      7-DAY PERFORMANCE HISTORY
4      ERROR SEC / UNAVAILABLE SEC
5      [HDSL LOOP 2]
6      HTU-C          HTU-C
7 12/02/97 00000/00000 00000/00000
8 12/28/97 00000/00000 00000/00000
9 12/29/97 00000/00000 00000/00000
0 12/30/97 00000/00000 00000/00000
1 12/31/97 00000/00000 00000/00000
2 01/01/98 00000/00000 00000/00000
3 01/02/98 00000/00000 00000/00000
4 CURRENT 00000/00000 00000/00000
5
6 PAGE-UP PAGE-DN HDSL1 DS1
12345678901234567890123456789012
  
```

HDSL Perform 6: DS1

```

12345678901234567890123456789012
1                                     12:30:55
2
3      7-DAY PERFORMANCE HISTORY
4      ERROR SEC / UNAVAILABLE SEC
5      [DS1]
6      HTU-C          HTU-C
7 12/02/97 00000/00000 00000/00000
8 12/28/97 00000/00000 00000/00000
9 12/29/97 00000/00000 00000/00000
0 12/30/97 00000/00000 00000/00000
1 12/31/97 00000/00000 00000/00000
2 01/01/98 00000/00000 00000/00000
3 01/02/98 00000/00000 00000/00000
4 CURRENT 00000/00000 00000/00000
5
6 PAGE-UP PAGE-DN HDSL1 HDSL2
12345678901234567890123456789012
  
```

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SunSet xDSL

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REV: A

HDSL Main Menu

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      HDSL MAIN MENU
4
5      TEST CONFIGURATION
6      VIEW SPAN STATUS
7      VIEW PERFORMANCE DATA
8      T1 BASIC MEASUREMENTS
9      LOOP BACK CONTROL
0      HDSL SYSTEM SETTINGS
1
2
3
4
5
6
12345678901234567890123456789012
```

HDSL LB 1

```
12345678901234567890123456789012
1                                     12:30:55 1
2
3      LOOPBACK CONTROL
4
5
6      MODE : LOOP-UP
7
8      TYPE : ESF-DL
9
0      CODE : HTU-C
1
2
3
4
5
6      LOOP-UP  LOOP-DN
12345678901234567890123456789012
```

1. F-Keys
MODE
F1: LOOP-UP, F2: LOOP-DN
TYPE:
F1: ESF-DL, F2: IN-BAND
CODE:
F1: HTU-C, F2: HTU-R, F3: NIU, F4: CSU
2. HTU-C LOOP BACK (per MD 6100-1)
A regenerative loop back of the DSX-1 signal toward the network
3. HTU-R LOOPBACK ((per MD 6100-1)
A regenerative loop back of the DS1 signal toward the network
4. CSU & NIU LOOPBACK
Similar to feature found in T1 products

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SunSet xDSL

MRD-10000-001

REV: A

HDSL Main Menu: E1 System

```
12345678901234567890123456789012
12:30:55
1
2
3      HDSL MAIN MENU
4
5      TEST CONFIGURATION
6
7      VIEW SPAN STATUS
8
9      VIEW PERFORMANCE DATA
10
11     E1 BASIC MEASUREMENTS
12
13     LOOP BACK CONTROL
14
15     HDSL SYSTEM SETTINGS
16
```

E1 HDSL:HTU-C

```
12345678901234567890123456789012
12:30:55
1
2
3      HDSL TEST CONFIGURATION
4
5      MODE      : HTU-C
6
7      PAYLOAD : E1
8
9
10
11     E1 SETUP
12
13     Rx LEVEL  : N/A
14
15     FRAME     : N/A
16
17     CRC-4     : N/A
18
19     LINE CODE : N/A
20
21     Tx CLOCK  : N/A
22
23     TEST RATE: 2.048 M
24
25     PATTERN   2E9
26
```

E1 HDSL:HTU-R

```
12345678901234567890123456789012
12:30:55
1
2
3      HDSL TEST CONFIGURATION
4
5      MODE      : HTU-R
6
7      PAYLOAD : E1
8
9
10
11     E1 SETUP
12
13     Rx LEVEL  : N/A
14
15     FRAME     : N/A
16
17     CRC-4     : N/A
18
19     LINE CODE : N/A
20
21     Tx CLOCK  : N/A
22
23     TEST RATE: 2.048 M
24
25     PATTERN   2E9
26
```

E1 HDSL:E1

```
12345678901234567890123456789012
12:30:55
1
2
3      HDSL TEST CONFIGURATION
4
5      MODE      : E1
6
7      PAYLOAD : E1
8
9
10
11     E1 SETUP
12
13     Rx LEVEL  : TERM
14
15     FRAME     : PCM-30
16
17     CRC-4     : YES
18
19     LINE CODE : HDB3
20
21     Tx CLOCK  : INTERN
22
23     TEST RATE: 2.048 M
24
25     PATTERN   2E9
26
```

F-Key Choices:

TYPE: HTU-C, HTU-R, E1 ; PAYLOAD: E1 (default)
Rx LEVEL: TERM, BRIDGE, MONITOR
FRAME: PCM-30, PCM-31, UNFRAME
CRC-4: YES, NO ; LINE CODE: HDB3
Tx CLOCK: INTERN, EXTERN, LOOP
TEST RATE: 2.048M, Nx64k
PATTERN: 2E6, 2E7, 2E9, 2E11, 2E15, 2E23, 1111, 0000, 0101, 1-8

7.3.8 ADSL Screens

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Sheet: 36

File Name: M10000A.DOC

Form #: FRM-10027

Rev: A

Date: 98-02-28

File name: F10027

SunSet xDSL

MRD-10000-001

REV: A

Opening of a Link: Note the status messages that are presented during the opening of a link. These messages are displayed in whatever ADSL menu the user goes to.

xDSL Main Menu

```
12345678901234567890123456789012
1                                     12:30:55
2
3      xDSL Testing
4
5
6      HDLSL/T1/E1
7      →ADSL
8
9
0
1
2
3
4
5
6
```

ADSL Link 1a

```
12345678901234567890123456789012
1                                     12:30:55
2 1>Opening Link
3 2>Initializing
4
5      ADSL
6
7  [SETUP]
8  MODEM STATUS
9  LINK MEASUREMENTS
0  PING
1
2
3
4
5
6
```

ADSL Link 1b

```
12345678901234567890123456789012
1                                     12:30:55
2 1>Opening Link
3 2>Activation Acknowledgment
4
5      ADSL
6
7  [SETUP]
8  MODEM STATUS
9  LINK MEASUREMENTS
0  PING
1
2
3
4
5
6
```

ADSL Link 1c

```
12345678901234567890123456789012
1                                     12:30:55
2 1>Opening Link
3 2>Transceiver training
4
5      ADSL
6
7  [SETUP]
8  MODEM STATUS
9  LINK MEASUREMENTS
0  PING
1
2
3
4
5
6
```

ADSL Link 1d

```
12345678901234567890123456789012
1                                     12:30:55
2 1>Opening Link
3 2>Channel Analysis
4
5      ADSL
6
7  [SETUP]
8  MODEM STATUS
9  LINK MEASUREMENTS
0  PING
1
2
3
4
5
6
```

ADSL Link 1e

```
12345678901234567890123456789012
1                                     12:30:55
2 1>LINK UP
3 2>
4
5      ADSL
6
7  [SETUP]
8  MODEM STATUS
9  LINK MEASUREMENTS
0  PING
1
2
3
4
5
6
```

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SunSet xDSL

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REV: A

xDSL Main Menu

```
12345678901234567890123456789012
12:30:55
1
2
3      xDSL Testing
4
5
6      HDSL/T1/E1
7      →ADSL
8
9
10
11
12
13
14
15
16
12345678901234567890123456789012
```

When the User pushes the xDSL key, the following screen appears

1. Pressing the ENTER key takes the user to the ADSL Main Menu
2. Immediately, the Opening of a Link sequence takes place.

ADSL Main Menu

```
12345678901234567890123456789012
12:30:55
1
2 >LINK UP
3 >
4
5      ADSL
6
7      [SETUP]
8      MODEM STATUS
9      LINK MEASUREMENTS
10     PING
11
12
13
14
15
16
12345678901234567890123456789012
```

1. All ADSL screens have Lines 1 and 2: 25 characters at the left reserved for status messages.
2. Normal messages are displayed on the lines while valid.
3. Exception messages that do not fit in the two lines are displayed on their own screen with a "PRESS ENTER TO CONTINUE" message.

ATU-E SETUP 1:

```
12345678901234567890123456789012
12:30:55
1
2 >LINK UP
3 >
4
5      SETUP 1
6      TYPE      : [ATU-R]
7
8
9
10
11
12
13
14
15
16
17
18
19
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24
25
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4 SETUP 1
5 TYPE : ATU-C
6 PROFILE : NORMAL
7 RATE ADAPT MODE : MODE 1
8 FAST PLN DN RATE : 1536 kbps
9 FAST PLN UP RATE : 384 kbps
0 FAST MIN DN RATE : 1280 kbps
1 FAST MIN UP RATE : 256 kbps
2 INT PLN DN RATE : 0 kbps
3 INT PLN UP RATE : 0 kbps
4 INT MIN DN RATE : 0 kbps
5 INT MIN UP RATE : 0 kbps more
6 +32 -32 +512 DEFAULT
12345678901234567890123456789012

```

F-Keys

TYPE: ATU-C, ATU-R
PROFILE: F1: NORMAL, F2: USER1,
F3: USER2, F4: USER3

RATE ADAPT MODE:
MODE 1, MODE 2, MODE 3

SETUP 1 Screen Fields for MODE 1:

- 1) FAST PLN DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 2) FAST PLN UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 3) FAST MIN DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 4) FAST MIN UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 5) INT PLN DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 6) INT PLN UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 7) INT MIN DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 8) INT MIN UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 9) Cursoring down at line 15 moves to SETUP 2

Notes:

1. Set has four profiles: NORMAL, USER1, USER2, USER3
 - a. Normal is viewable and editable.
 - As soon as it is edited, NORMAL is replaced by USER1
 - NORMAL always available as an F-Key
 - NORMAL is default profile after NV RAM Erase.
 - b. USER 1 to 3 are editable and stored
 - c. May add templates (i.e. PBELL1, AMTECH1) which act like NORMAL
 - Stored Profiles are immune to NV RAM Erase.
2. Interleaved Fields are only available if no selections made for Fast. Otherwise, defaulted to 0 kbps.

ATU-C SETUP 2: Normal, Mode 1

```

12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4 SETUP 2
5 Min Mar DN : 1 dB
6 Min Mar UP : 1 dB
7 Max Mar DN : 31 dB
8 Max Mar UP : 31 dB
9 Target Mar DN : 6 dB
0 Target Mar UP : 6 dB
1 Max PSD DN : -34 dBm/Hz
2 Max Power DN : 20 dBm
3 Max Power UP : 20 dBm
4 Max Delay DN : 20 ms
5 Max Delay UP : 20 ms
6 MORE LESS NORMAL
12345678901234567890123456789012

```

1. F-KEYS:

- a. Line 5 to 10 has 0 to 31 dB range.
F1: MORE, F2: LESS, F3: NORMAL
- b. Line 11 has -34 to -52 dBm/Hz range
F1: MORE, F2: LESS, F3: NORMAL
- c. Lines 12&13 has 0 to 20 dBm range
F1: MORE, F2: LESS, F3: NORMAL
- d. Lines 14 & 15 has 0 to 255 ms range
F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1

Notes:

- 1) Min Margin must be at least 1 dB < Target Margin
- 2) Max Delay only applies if Interleaver Used

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

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Form #: FRM-10027

Rev: A

Date: 98-02-28

File name: F10027

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MRD-10000-001

REV: A

ATU-C SETUP 1: Normal, Mode 2

```
12345678901234567890123456789012
1                                     12:30:55
2>LINK UP
3>
4      SETUP 1
5TYPE      : ATU-C
6PROFILE    : NORMAL
7RATE ADAPT MODE : MODE 2
8FAST MAX DN RATE: 1536 kbps
9FAST MAX UP RATE: 384 kbps
0INT  MAX DN RATE: 1536 kbps
1INT  MAX UP RATE: 384 kbps
2RATIO DOWNSTREAM: 100 %
3RATIO UPSTREAM  : 100 %
4
5
6  +32  -32  +512  DEFAULT
12345678901234567890123456789012
```

F-Keys

TYPE: ATU-C, ATU-R
PROFILE: F1: NORMAL, F2: USER1, F3: USER2,
F4: USER3
RATE ADAPT MODE: MODE 1, MODE 2, MODE 3

SETUP 1 Screen Fields for MODE 2:

- 1) FAST MAX DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 2) FAST MAX UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 3) INT MAX DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 4) INT MAX UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 5) RATIO DOWNSTREAM:
F1: 100, F2: 0
- 6) RATIO UPSTREAM:
F1: 100, F2: 0
- 7) Cursoring down at line 13 moves to SETUP 2

Notes:

1. Set has four profiles: NORMAL, USER1, USER2, USER3
 - a. Normal is viewable and editable.
 - As soon as it is edited, NORMAL is replaced by USER1
 - NORMAL then becomes an F-Key option
 - NORMAL is default profile after NV RAM Erase.
 - b. USER 1 to 3 are editable and stored
 - c. May add templates (i.e. PBELL1, AMTECH1) which act like NORMAL
 - Stored Profiles are immune to NV RAM Erase.

ATU-C SETUP 2: Normal, Mode 2

```
12345678901234567890123456789012
1                                     12:30:55
2>LINK UP
3>
4      SETUP 2
5Min Mar    DN: 1 dB
6Min Mar    UP: 1 dB
7Max Mar    DN: 31 dB
8Max Mar    UP: 31 dB
9Target Mar DN: 6 dB
0Target Mar UP: 6 dB
1Max PSD    DN: -34 dBm/Hz
2Max Power  DN: 20 dBm
3Max Power  UP: 20 dBm
4Max Delay  DN: 20 ms
5Max Delay  UP: 20 ms
6  MORE  LESS  NORMAL
12345678901234567890123456789012
```

1. F-KEYS:

- a. Line 5 to 10 has 0 to 31 dB range.
F1: MORE, F2: LESS, F3: NORMAL
- b. Line 11 has -34 to -52 dBm/Hz range
F1: MORE, F2: LESS, F3: NORMAL
- c. Lines 12&13 has 0 to 20 dBm range
F1: MORE, F2: LESS, F3: NORMAL
- d. Lines 14 & 15 has 0 to 255 ms range
F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1

Notes:

- 1) Min Margin must be at least 1 dB < Target Margin
- 2) Max Delay only applies if Interleaver Used

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

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REV: A

ATU-C SETUP 1: Normal, Mode 2

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4
5      SETUP 1
6 TYPE          : ATU-C
7 PROFILE        : NORMAL
8 RATE ADAPT MODE : MODE 2
9 FAST MAX DN RATE: 1536 kbps
10 FAST MAX UP RATE: 384 kbps
11 INT MAX DN RATE: 1536 kbps
12 INT MAX UP RATE: 384 kbps
13 RATIO DOWNSTREAM: 100 %
14 RATIO UPSTREAM  : 100 %
15
16 +32 -32 +512 DEFAULT
17 12345678901234567890123456789012
```

F-Keys

TYPE: ATU-C, ATU-R
PROFILE: F1: NORMAL, F2: USER1, F3: USER2, F4: USER3
RATE ADAPT MODE: MODE 1, MODE 2, MODE 3
SETUP 1 Screen Fields for MODE 2:
1) FAST MAX DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
2) FAST MAX UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
3) INT MAX DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
4) INT MAX UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
5) RATIO DOWNSTREAM:
F1: 100, F2: 0
6) RATIO UPSTREAM:
F1: 100, F2: 0
7) Cursoring down at line 13 moves to SETUP 2

Notes:

1. Set has four profiles: NORMAL, USER1, USER2, USER3
 - a. Normal is viewable and editable.
 - As soon as it is edited, NORMAL is replaced by USER1
 - NORMAL then becomes an F-Key option
 - NORMAL is default profile after NV RAM Erase.
 - b. USER 1 to 3 are editable and stored
 - c. May add templates (i.e. PBELL1, AMTECH1) which act like NORMAL
 - Stored Profiles are immune to NV RAM Erase.

ATU-C SETUP 2: Normal, Mode 2

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4
5      SETUP 2
6 Min Mar      DN: 1 dB
7 Min Mar      UP: 1 dB
8 Max Mar      DN: 31 dB
9 Max Mar      UP: 31 dB
10 Target Mar   DN: 6 dB
11 Target Mar   UP: 6 dB
12 Max PSD      DN: -34 dBm/Hz
13 Max Power    DN: 20 dBm
14 Max Power    UP: 20 dBm
15 Max Delay    DN: 20 ms
16 Max Delay    UP: 20 ms
17 MORE LESS NORMAL
18 12345678901234567890123456789012
```

1. F-KEYS:

- a. Line 5 to 10 has 0 to 31 dB range.
F1: MORE, F2: LESS, F3: NORMAL
- b. Line 11 has -34 to -52 dBm/Hz range
F1: MORE, F2: LESS, F3: NORMAL
- c. Lines 12&13 has 0 to 20 dBm range
F1: MORE, F2: LESS, F3: NORMAL
- d. Lines 14 & 15 has 0 to 255 ms range
F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1

Notes:

- 1) Min Margin must be at least 1 dB < Target Margin
- 2) Max Delay only applies if Interleaver Used

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

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SunSet xDSL

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REV: A

ATU-C SETUP 1: Normal, Mode 3

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4
5      SETUP 1
6 TYPE      : ATU-C
7 PROFILE   : NORMAL
8 RATE ADAPT MODE : MODE 3
9 INT MAX DN RATE : 1536 kbps
10 INT MAX UP RATE : 384 kbps
11 FAST MAX DN RATE : 1536 kbps
12 FAST MAX UP RATE : 384 kbps
13 RATIO DOWNSTREAM : 100 %
14 RATIO UPSTREAM  : 100 % more
15
16 +32 -32 +512 DEFAULT
```

F-Keys

TYPE: ATU-C, ATU-R
PROFILE: F1: NORMAL, F2: USER1,
F3: USER2, F4: USER3
RATE ADAPT MODE:
MODE 1, MODE 2, MODE 3

SETUP 1 Screen Fields for MODE 2:

- 1) FAST MAX DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 2) FAST MAX UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 3) INT MAX DN RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 4) INT MAX UP RATE:
F1: +32, F2: -32, F3: +512, F4: DEFAULT
- 5) RATIO DOWNSTREAM:
F1: 100, F2: 0
- 6) RATIO UPSTREAM:
F1: 100, F2: 0
- 7) Cursoring down at line 13 moves to SETUP 2

ATU-C SETUP 2: Normal, Mode 3

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4
5      SETUP 2
6 Min Mar DN : 1 dB more
7 Min Mar UP : 1 dB
8 Max Mar DN : 31 dB
9 Max Mar UP : 31 dB
10 Target Mar DN : 6 dB
11 Target Mar UP : 6 dB
12 Max PSD DN : -34 dBm/Hz
13 Max Power DN : 20 dBm
14 Max Power UP : 20 dBm
15 Max Delay DN : 20 ms
16 Max Delay UP : 20 ms more
17 MORE LESS NORMAL
```

1. F-KEYS:

- a. Line 5 to 10 has 0 to 31 dB range.
F1: MORE, F2: LESS, F3: NORMAL
- b. Line 11 has -34 to -52 dBm/Hz range
F1: MORE, F2: LESS, F3: NORMAL
- c. Lines 12&13 has 0 to 20 dBm range
F1: MORE, F2: LESS, F3: NORMAL
- d. Lines 14 & 15 has 0 to 255 ms range
F1: MORE, F2: LESS, F3: NORMAL

1. Cursoring up at line 5 moves to SETUP 1
2. Cursoring down at line 15 moves to
SETUP 3

Notes:

- 1) Min Margin must be at least
1 dB < Target Margin
- 2) Max Delay only applies if
Interleaver Used

ATU-C SETUP 3: Normal, Mode 3

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4
5      SETUP 3
6 DNshift Mar DN : 4 dB more
7 DNshift Mar UP : 8 dB
8 UPshift Mar DN : 4 dB
9 UPshift Mar UP : 8 dB
10 DNshift Intv DN : 20 s
11 DNshift Intv UP : 20 s
12 UPshift Intv DN : 20 s
13 UPshift Intv UP : 20 s more
14
15 MORE LESS NORMAL
```

1. F-KEYS:

- a. Line 5 to 8 has 0 to 31 dB range.
F1: MORE, F2: LESS, F3: NORMAL
- b. Line 9 to 12 has 0 to 255 s range
F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 2
3. Cursoring down at line 12 moves to SETUP 1

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

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Rev: A

Date: 98-02-28

Sheet 42

File Name: M10000A.DOC

Form #: FRM-10027

Rev: A

Date: 98-02-28

File name: F10027

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REV: A

ADSL MOD STAT 1

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >LINK UP <2
3 > <3
4          MODEM STATUS 4
5
6          GENERAL STATUS 6
7          BITS GRAPHIC/TABLE 7
8          CARRIER MASK 8
9          CLOSE LINK 9
0          OPEN LINK 0
1          ATU MODULE SELF TEST 1
2
3
4
5
6
12345678901234567890123456789012
```

ADSL MOD STAT 2

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >LINK UP <2
3 > <3
4          GENERAL STATUS 4
5
6          ATU-C REV:    ATU-C MFR:ALCT 6
7          ATU-R REV:    ATU-R MFR:ALCT 7
8
9          [DOWNSTREAM]    [UPSTREAM] 9
0 CAPACITY:70%    CAPACITY:60% 0
1 MARGIN : 5 dBm MARGIN : 6 dBm 1
2 POWER :20 dBm POWER :20 dBm 2
3 ATTEN :45 dBm ATTEN :45 dBm 3
4 FAST RTE: FAST RTE: 4
5 SLOW RTE: 1536 SLOW RTE: 384 5
6
12345678901234567890123456789012
```

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

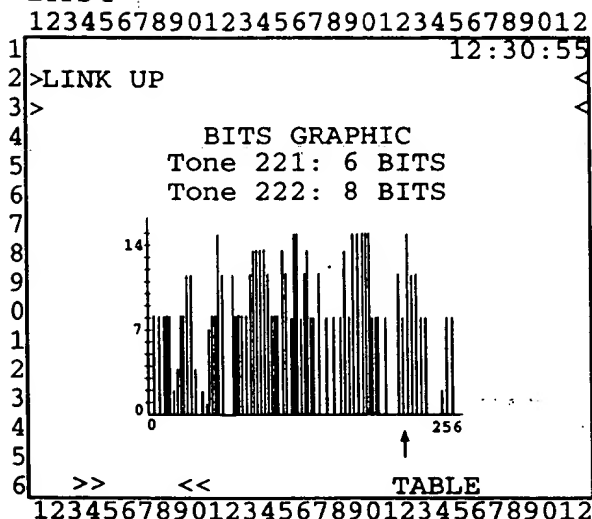
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Form #: FRM-10027	Rev: A	Date: 98-02-28	File name: F10027	

SunSet xDSL

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REV: A

BITS 1



BITS 2

12345678901234567890123456789012 12:30:55

1 >LINK UP

3 >

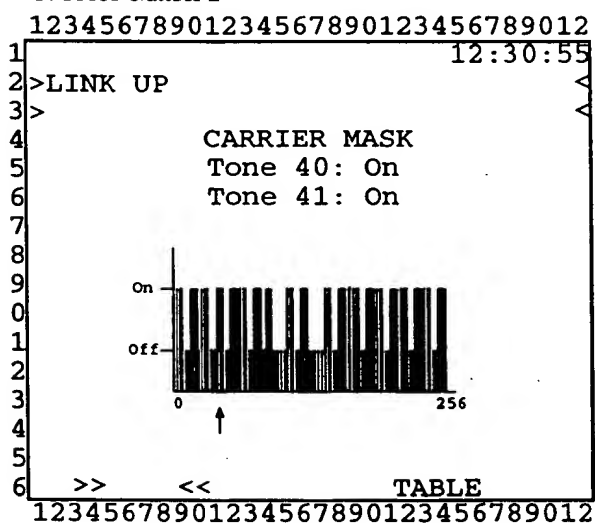
4 BITS TABLE

#	BITS	#	BITS	#	BITS	#	BITS
70	8	8	0	16	7	24	12
81	7	9	0	17	8	25	9
92	6	10	3	18	7	26	8
03	8	11	11	19	8	27	7
14	7	12	5	20	0	28	4
25	8	13	7	21	2	29	0
36	5	14	8	22	2	30	3
47	4	15	8	23	6	31	4

6 PAGE-UP PAGE-DN GRAPHIC

12345678901234567890123456789012

Carrier Mask 1



Carrier Mask 2

12345678901234567890123456789012 12:30:55

1 >LINK UP

3 >

4 CARRIER MASK

#	STATE	#	STATE	#	STATE	#	STATE
70	ON	8	ON	16	ON	24	ON
81	ON	9	ON	17	ON	25	ON
92	OFF	10	OFF	18	OFF	26	OFF
03	ON	11	ON	19	ON	27	ON
14	ON	12	ON	20	ON	28	ON
25	OFF	13	OFF	21	OFF	29	OFF
36	OFF	14	OFF	22	OFF	30	OFF
47	ON	15	ON	23	ON	31	ON

6 PAGE-UP PAGE-DN GRAPHIC

12345678901234567890123456789012

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Rev: A

Date: 98-02-28

Sheet 44

File Name: M10000A.DOC

Form #: FRM-10027

Rev: A

Date: 98-02-28

File name: F10027

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REV: A

ADSL MOD STAT 1

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4 MODEM STATUS
5
6 GENERAL STATUS
7 BITS GRAPHIC/TABLE
8 CARRIER MASK
9 CLOSE LINK
0 OPEN LINK
1 ATU MODULE SELF TEST
2
3
4
5
6
```

Close Link 1

```
12345678901234567890123456789012
1 12:28:25
2 >LINK UP
3 >
4 CLOSE LINK
5
6 PRESS ENTER TO CLOSE LINK
7
8
9
0
1
2
3
4
5
6
```

Close Link 2

```
12345678901234567890123456789012
1 12:28:25
2 >CLOSING LINK
3 >
4 CLOSE LINK
5
6
7 CLOSING LINK ...
8
9
0
1
2
3
4
5
6
```

Close Link 3

```
12345678901234567890123456789012
1 12:28:25
2 >LINK DOWN
3 >
4 CLOSE LINK
5
6 COMPLETE
7
8
9
0
1
2
3
4
5
6
```

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

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Form #: FRM-10027	Rev: A	Date: 98-02-28	File name: F10027	

SunSet xDSL

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REV: A

ADSL MOD STAT 1

```
12345678901234567890123456789012
1                                     12:30:55 1
2>LINK UP                             <2
3>                                     <3
4      MODEM STATUS                     4
5                                         5
6      GENERAL STATUS                   6
7      BITS GRAPHIC/TABLE               7
8      CARRIER MASK                     8
9      CLOSE LINK                       9
0      OPEN LINK                        0
1      ATU MODULE SELF TEST             1
2                                         2
3                                         3
4                                         4
5                                         5
6                                         6
12345678901234567890123456789012
```

Open Link 1a

```
12345678901234567890123456789012
1                                     12:28:25 1
2>LINK DOWN                             <2
3>                                     <3
4      OPEN LINK                       4
5                                         5
6                                         6
7      PRESS ENTER TO OPEN LINK        7
8                                         8
9                                         9
0                                         0
1                                         1
2                                         2
3                                         3
4                                         4
5                                         5
6                                         6
12345678901234567890123456789012
```

Open Link 1b

```
12345678901234567890123456789012
1                                     12:30:55 1
2>LINK UP                             <2
3>                                     <3
4      OPEN LINK                       4
5                                         5
6      LINK ALREADY OPEN                6
7                                         7
8                                         8
9                                         9
0                                         0
1                                         1
2                                         2
3                                         3
4                                         4
5                                         5
6                                         6
12345678901234567890123456789012
```

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Date: 98-02-28

Sheet: 46

File Name: M10000A.DOC

Form #: FRM-10027

Rev: A

Date: 98-02-28

File name: F10027

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REV: A

ADSL MOD STAT 1

```
12345678901234567890123456789012
1 12:30:55
2 >LINK UP
3 >
4 MODEM STATUS
5
6 GENERAL STATUS
7 BITS GRAPHIC/TABLE
8 CARRIER MASK
9 CLOSE LINK
0 OPEN LINK
1 ATU MODULE SELF TEST
2
3
4
5
6
12345678901234567890123456789012
```

ATU Module - Self Test 1a

```
12345678901234567890123456789012
1 12:30:55
2 >SELF TEST
3 >
4 ATU MODULE
5 SELF TEST
6
7 TESTING...
8
9
0
1
2
3
4
5
6
12345678901234567890123456789012
```

ATU Module - Self Test 1b

```
12345678901234567890123456789012
1 12:30:55
2 >SELF TEST
3 >
4 ATU MODULE
5 SELF TEST
6
7
8 COMPLETE
9 NO ERRORS
0
1
2
3
4
5
6
12345678901234567890123456789012
```

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

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REV: A

ADSL Main Menu

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >LINK UP                           <2
3 >                                  <3
4                                     4
5                                     5
6                                     6
7                                     7
8                                     8
9                                     9
10                                    0
11                                    1
12                                    2
13                                    3
14                                    4
15                                    5
16                                    6

      ADSL

      SETUP
      MODEM STATUS
      LINK MEASUREMENTS
      PING
```

Link Measurements 1

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >LINK UP                           ET: 042:30:00 <2
3 >                                  RT: 005:25:25 <3
4                                     4
5                                     5
6                                     6
7                                     7
8                                     8
9                                     9
10                                    0
11                                    1
12                                    2
13                                    3
14                                    4
15                                    5
16                                    6

      LINK MEASUREMENTS 1

      [ATU-C]          [ATU-R]
7 FEC INT :          FEC INT : _ _ _
8 FECI Rate:0.0e-9 FECI Rate:_ _ _
9 FEC Fast : _ _ _   FEC Fast : _ _ _
0 FECF Rate:0.0e-9 FECF Rate:_ _ _
1 CRC Int : _ _ _   CRC Int : _ _ _
2 CRC IRate:0.0e-9
3 CRC Fast : _ _ _   CRC Fast : _ _ _
4 CRCF Rate:_ _ _   CRCF Rate:
5
6 PAGE-UP PAGE-DN RESTART
```

Link Measurements 2

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >LINK UP                           ET: 042:30:00 <2
3 >                                  RT: 005:25:25 <3
4                                     4
5                                     5
6                                     6
7                                     7
8                                     8
9                                     9
10                                    0
11                                    1
12                                    2
13                                    3
14                                    4
15                                    5
16                                    6

      LINK MEASUREMENTS 2

      [ATU-C]          [ATU-R]
6 HECI :          HECI :
7 HECI Rate:      HECI Rate:
8 HEC Fast :      HEC Fast :
9 HECF Rate:      HECF Rate:
0 ES :          ES :
1 ES% :          ES% :
2 UAS :          UAS :
3 UAS% :          UAS% :
4
5
6 PAGE-UP PAGE-DN RESTART
```

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SunSet xDSL

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REV: A

Status Message Screens:

Displayed until User presses F1: CONTINU, ENTER, or ESC

ADSL STATUS 1a

```
12345678901234567890123456789012
1                                     12:30:55
2>LINK DOWN                         <2
3>                                  <3
4  STATUS: DOWN                     4
5  Requested Bit Rate too high      5
6  Maximum Attainable Rates:       6
7    UPSTREAM   : 192 kbps          7
8    DOWNSTREAM : 1024 kbps         8
9                                     9
0  (No lock possible)              0
1  (Protocol error)                1
2  (Message error)                 2
3                                     3
4                                     4
5                                     5
6  CONTINU                         6
12345678901234567890123456789012
```

ADSL STATUS 1b

```
12345678901234567890123456789012
1                                     12:30:55
2>LINK UP                           <2
3>                                  <3
4  LINK STARTED                     4
5  REDUCED SPEED                    5
6                                     6
7    UPSTREAM   : 192 kbps          7
8    DOWNSTREAM : 1024 kbps         8
9                                     9
0                                     0
1                                     1
2                                     2
3                                     3
4                                     4
5                                     5
6  CONTINU                         6
12345678901234567890123456789012
```

ADSL STATUS 2

```
12345678901234567890123456789012
1                                     12:30:55
2>                                  <2
3>                                  <3
4  MODEM STATUS                     4
5                                     5
6                                     6
7  PLEASE WAIT                      7
8                                     8
9  OPENING LINK ...                 9
0                                     0
1                                     1
2                                     2
3                                     3
4                                     4
5                                     5
6                                     6
12345678901234567890123456789012
```

If a menu function is not available during the opening of the link, then a message like the one depicted here will be displayed.

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SunSet xDSL

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REV: A

Following Screens Require Further Study:

STORE/RECALL 1

```
12345678901234567890123456789012
1                                     12:30:55
2
3      MEASUREMENT STORAGE
4 12345678901234567890123456789012
5 No. DATE-YMD TIME-HMS LABEL
6 CUR 97/10/31 15:23:11 BAD 96 kHz
7 001 97/11/30 09:30:12 OPEN
8 002 97/12/30 19:19:19 LOAD COIL
9 003 98/01/30 13:09:55 GOOD DMT
0
1
2
3
4
5
6 VIEW      DELETE      STORE      more
```

LABEL PRINT CLR-ALL more
RESULTS PAGE-UP PAGE-DN more

1. The User can access this Menu in any mode at any time by pressing the STORE/RECALL key.
 - a. User can then store any measurements or recall any previously saved measurements.
 - b. User can also initiate all functions shown as F-Keys.

STORE/RECALL 3

```
12345678901234567890123456789012
1                                     12:30:55
2
3      MEASUREMENT STORAGE
4 LABEL      :
5 FILE No. :
6
7
8      A B C D E F G
9      H I J K L M N
0      O P Q R S T U
1      V W X Y Z - /
2
3
4
5
6 INSERT      DELETE      TOGGLE      SELECT
```

OTHER SETUP Main Menu

```
12345678901234567890123456789012
1                                     12:30:55
2
3      OTHER SETUP
4
5      DEFAULT SETTINGS
6      TEST PARAMETERS
7      GENERAL CONFIG
8      ERASE NV RAM
9      VERSION/OPTION
0
1
2
3
4
5
6 12345678901234567890123456789012
```

1. The User can access the Other Setup Main Menu at any time by pressing the OTHER key.

Note: User defined default settings should remain permanent unless changed by User (immune to NV RAM erase)

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SunSet xDSL

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REV: A

R&D to Research Feasibility of following Screens:

ADSL Main Menu

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >Link Up                           <2
3 >                                   <3
4                                     4
5                                ADSL
6
7                                SETUP
8                                MODEM STATUS
9                                LINK MEASUREMENTS
0                                PING
1
2
3
4
5
6
12345678901234567890123456789012
```

ADSL PING 1

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >Link Up                           <2
3 >                                   <3
4                                     4
5                                PING
6
7 MY ADDRESS : 207.105.13.7
8 PING ADDRESS: 207.105.13.10
9 VPI       : 1
0 VCI       :
1 # OF BYTES :
2 TIME OUT  :
3
4
5
6 MORE LESS START
12345678901234567890123456789012
```

ADSL PING 2

```
12345678901234567890123456789012
1                                     12:30:55 1
2 >Link Up                           <2
3 >                                   <3
4                                     4
5                                PING RESULTS
6
7 REPLY FROM : 207.103.13.10
8 BYTE       : 32
9 DELAY      : 392 ms
0
1
2
3
4
5
6 REPEAT
12345678901234567890123456789012
```

1. Pressing REPEAT performs PING operation again.

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REV: A

8.0 Configuration and Preliminary Pricing

8.1 Cost of Material:

BASE:

MOTOU 4M
LED
LCD
DSP
TIMS
TDR+DMM
MODM
Chassis
Panels
Manual
Memory Card
Stand
Miscellaneous

Sub Total

HDSL:

PairGain Card
Transformer (2x\$5)
XC5204
DS2141A (T1/E1)
PCB
Plastic Cover (insert)

Sub Total

ADSL (estimates):

Alcatel Chips
Xylinx
Memory
Microcontroller
Transformer
Amplifier
PCB
Plastic Cover (insert)

Sub Total

5.2 Suggested Pricing

Base
HDSL module
ADSL module
Accessories
IP Ping

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Annex

A. Target Markets

A.1 Targeted Industries:

- RBOCs and PTTs
- CAPs
- Local Telcos and CLECs
- xDSL Modem Suppliers

A.2 Estimated Total Sales at Maturity:

B. Customer Benefits

- B1. The SS xDSL enables the xDSL installation technician to be more successful in provisioning lines that will work when turned over to the customer. The set tells him how fast the line will run and how much noise margin there is. The set also provides useful diagnostic information on lines that will not support successful modem turn-up. Consequently, SS xDSL saves the technician time when installing xDSL services and enables him to meet service dates with higher accuracy.
- B2. The SS xDSL is an essential tool for the 2nd tier service technician to quickly identify trouble sources and take effective corrective action. The set sectionalizes problems clearly between CPE, access line, Central Office provisioning, backbone network (future consideration requiring UPI, VPI), and far end network (future consideration requiring PING). It eliminates the finger pointing between the circuit provider and the computer installer.
- B3. The SS xDSL provides Layers 1, 2, and 3 Qualification for DSL lines
- B4. The SS xDSL handles multiple brands of xDSL- initially ADSL and HDSL. VDSL, RADSL, and others will be supported upon market demand.
- B5. The SS xDSL is a simple and convenient solution because it provides testing capability that normally requires multiple pieces of equipment.
- a. Example: Two SunSet xDSLs vs. Six separate pieces: TDR, DMM, Load Coil Detector, Wideband TIMS, xTU-R, XTU-C

C. Direct Competition and Substitutes

C.1 Key Sales Proposition:

The SunSet xDSL offers an unparalleled solution for the installation and maintenance of xDSL lines.

C.2 Major Competitors:

Currently, the SunSet xDSL has no direct competitors. Several vendors offer substitutes (i.e. test Layer 1 only; verify modem cards; Test Layer 3 Connectivity via an ethernet port)

C.3 Key advantages: The SS xDSL is the only field test set which can properly qualify copper lines for xDSL transmission. It is the only set that offers emulation of the actual modems and provide thorough Layer 1 assessment of xDSL transmission capability. It may have Layer 3 functionality to test the backbone network and the far end network.

C.4 Potential shortcomings: The SS xDSL does not provide certain Layer 1 tests offered by specialized cable testers. However, the SS xDSL performs the most relevant tests to accurately forecast modem performance. Furthermore, the SS xDSL verifies the actual modem performance on a pair(s), which no other test set can boast.

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SunSet xDSL

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REV: A

FEATURES	SunSet xDSL				
Physical Layer Testing					
Slave / Transponder Unit	YES	NO	NO	NO	Yes
DC & AC Volt Meter	YES	NO	NO	Yes	NO
Ohm Meter	YES	NO	NO	Yes	NO
Capacitance Meter	YES	NO	NO	NO	NO
Loop Resistance	YES	NO	NO	NO	Yes
Power Influence	YES	NO	NO	Yes	Yes
TDR	10 to 18000 ft	NO	NO	3 to 30000 ft	NO
Load Coil Detector	YES	NO	Up to 4	Up to 4	Yes
Insertion Loss : Full DMT	YES	NO	196 kHz, 392 KHz	200 Hz - 200 kHz	28, 32, 40, 196 kHz
Signal to Noise	YES	NO	NO	NO	NO
Background Noise	YES	NO	NO	NO	NO
Impulse Noise	No	NO	NO	NO	Yes
Noise Metallic	No	NO	NO	0 to 50 dBmC	NO
Noise to Ground	No	NO	NO	40 to 100 dBmC	NO
Longitudinal Balance	No	NO	NO	62 to 40 dB	54 to 40 dB
Patch Cable Testing	No	Yes	NO	NO	NO
Fiber Optic Testing	No	Yes	NO	NO	NO
T1 BERT	YES	NO	Yes	NO	NO
T1 Loopback Control	YES	NO	Yes	NO	NO
Dialing	No	NO	NO	DTMF, Pulse	NO
ISDN Testing	No	NO	NO	Link, NEBE, FEBE	NO
E1 BERT	YES	NO	NO	NO	NO
E1 Loopback Control	YES	NO	NO	NO	NO
Link Layer Testing					
ATU-C Emulation	YES	NO	NO	NO	NO
ATU-R Emulation	YES	NO	NO	NO	NO
HTU-C Emulation	YES	NO	NO	NO	NO
HTU-R Emulation	YES	NO	NO	NO	NO
Generate HDSL signal on span	YES	NO	Plug-in Cards	NO	NO
Generate ADSL Traffic	YES	Yes	NO	NO	NO
Measure ADSL statistics	YES	Via Ethernet interface	NO	NO	NO
Network Layer Testing					
Ethernet Interface Required	Not Required	Required	NO	NO	NO
IP/IPX Ping	Future Consideration	Yes	NO	NO	NO
VPI, VCI Provisioning & Verification	Future Consideration	Sort of	NO	NO	NO
Ethernet Troubleshooting:	No	Yes	NO	NO	NO
NIC, Hub component check	No	Yes	NO	NO	NO
SMNP System Group Query	No	Yes	NO	NO	NO
General					
Connectors	Bantam, 3 RJ-45	Dual RJ-45		2 mm banana to clips	3-wire clips
Serial Port	RS-232C or DB 9	RS-232C			NO
Display	192 x 128 pixels			192 x 192 pixels	
Keypad	20 keys	Icon Touchscreen		24 keys	3 keys
LEDs	18 bi-color				None
Speaker	YES	NONE		30 mm diameter	None
Microphone	??	NONE		Electret	None
Battery Life	NimH (5 Hr.)	NimH (2 Hr.)		NimH (4 Hr.)	4 AA Cells
Memory	??			1 MB	
Dimensions (cm x cm x cm)	10.5 x 6 x 27	20.5 x 10.9 x 5.4	30.5 x 30.5 x 45.7	25 x 10 x 6	10.8 x 27.3 x 6.4
Transponder	10.5 x 6 x 27	None	None	NO	9.5 x 15.7 x 4.6
Weight	1.3 kg (2.8 lbs)	0.7 kg (1.7 lb)	15 lbs	1.5 kg (3.3 lb)	2 lbs, 1lb (Trans)
Pricing					
	See MRD	\$4195 - 10 Mb/s	\$3300 Base	\$6,080	
		\$5495 - 10/100 Mb/s	\$600 Accessories		

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D. Early Opportunities

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REV: A

E. Deployment Strategies and Schedule

E.1 Emulator Prototype: Ongoing

E.2 First Prototype: December 1997

- Layer 1 Minimum Function: DMM, TDR, Insertion Loss measurements up to 25 feet for 24 AWG RJ-48 cable

E.3 First Real Prototype: 2nd Week, April 1998

- Layer 1 testing with fully functional DMM, TDR, Line Measurements (Insertion Loss, Signal to Noise, Background Noise, Loop Resistance).
- One-way communication for Master/Slave functions
- No calibration between Master/Slave; Estimated error in measurements
 - DMM: 1%
 - TDR: 1%
 - Line Measurements: 10%
- Preliminary Verification to start with this version and ongoing henceforth.

E.4 Phase 2 Complete: Good Working Prototype with Minimum features for initial market introductions: June 1998 at SuperComm

- Full Layer 1
- HDSL Prototype: HTU-R, HTU-C
- ADSL Prototype (Possible): ATU-R, ATU-C

E.6 Beta Product and Demonstrators: August 1998

E.7 Successful beta trial completion: November 1998

E.8 Shipment of units: December 1998

E.9 Subsequent Features (i.e. PING, HDSL Span Power Supply): February 1999

E.10 Phase 3 Completion (Final Verification Testing, MRD Conformance): April 1999

F. Technical Partnering

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